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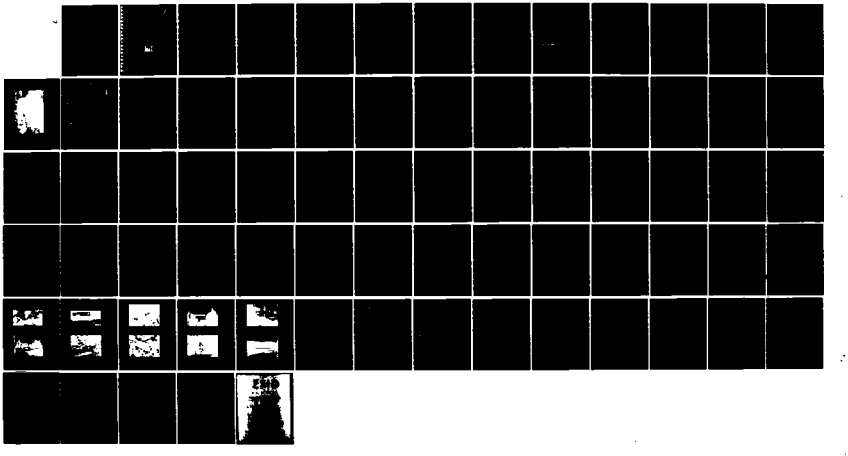

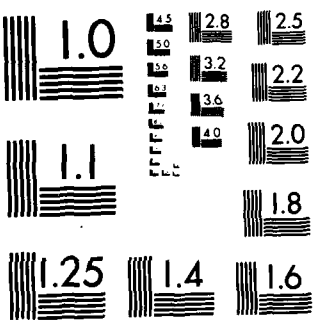

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QUINNIPIAC RIVER BASIN
MERIDEN, CONNECTICUT

BLACK POND DAM
CT 00135

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

FEBRUARY, 1981

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Quinnipiac River Basin
Meriden, Conn.
Black Pond Dam

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Black Pond Dam is a stone masonry and earth embankment structure approx. 100 ft. long and 26 ft. high with a 25 ft. wide paved road. The dam is judged to be in fair condition with several areas that require attention. These areas include seepage through the dam, missing mortar in the downstream face, trees on the embankments as well as along the toe of the dam and the lack of a low-level discharge pipe. The dam is classified as SMALL and has High hazard potential.The test flood ranges from 1/2 the PMF to the PMF.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

NEDED-E

MAR 20 1981

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Black Pond Dam (CT-00135) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis. A brief assessment is included at the beginning of the report.

The preliminary hydrologic analysis has indicated that the spillway capacity for the Black Pond Dam would likely be exceeded by floods greater than 28 percent of the Probable Maximum Flood (PMF). Our screening criteria specifies that a dam of this class which does not have sufficient spillway capacity to discharge fifty percent of the PMF, should be adjudged as having a seriously inadequate spillway and the dam assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The term "unsafe" applied to a dam because of an inadequate spillway does not indicate the same degree of emergency as that term would if applied because of structural deficiency. It does indicate, however, that a severe storm may cause overtopping and possible failure of the dam, with significant damage and potential loss of life downstream.

It is recommended that within twelve months from the date of this report the owner of the dam engage the services of a professional or consulting engineer to determine by more sophisticated methods and procedures the magnitude of the spillway deficiency. Based on this determination, appropriate remedial mitigating measures should be designed and completed within 24 months of this date of notification. In the interim a detailed emergency operation plan and warning system should be promptly developed. During periods of unusually heavy precipitation, round-the-clock surveillance should be provided.

NEDED-E
Honorable William A. O'Neill

I have approved the report and support the findings and recommendations described in Section 7, with qualifications as noted above. I request that you keep me informed of the actions taken to implement these recommendations since this follow-up is an important part of the non-Federal Dam Inspection Program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. This report has also been furnished to the owner of the project, The City of Meriden, Meriden, CT.

Copies of this report will be made available to the public, upon request to this office, under the Freedom of Information Act, thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for the cooperation extended in carrying out this program.

Sincerely,

C.E. EDGAR, III
Colonel, Corps of Engineers
Division Engineer

BLACK POND DAM

CT 00135

QUINNIPIAC RIVER BASIN

MERIDEN, CONNECTICUT

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification Number:	CT 00135
Name:	Black Pond Dam
City:	Meriden
County and State:	New Haven County, Connecticut
Stream:	Spoon Shop Brook
Date of Inspection:	October 21, 1980

BRIEF ASSESSMENT

Black Pond Dam is a stone masonry and earth embankment structure approximately 100 feet long and 26 feet high with a 25-foot wide paved road (Birdsey Avenue) on the crest. A majority of the downstream embankment consists of a vertical stone masonry face. The 14-foot wide spillway is a 14-foot by 3-foot concrete culvert under the road at approximately the center of the dam. There is a mortared stone gate inlet structure that controls a 20-inch cast iron water main that passes through the base of the dam. The water main connects into the City's distribution network, and is used only for emergencies. There is no low-level discharge. The pond is presently used for recreation. The drainage area is 1.2 square miles and the reservoir has approximately 353 acre-feet of storage capacity.

The assessment of the dam is based on the visual inspection, past operational performance and hydraulic/hydrologic computations. The dam is judged to be in fair condition with several areas that require attention. These areas include seepage through the dam, missing mortar in the downstream face, trees on the embankments as well as along the toe of the dam and the lack of a low-level discharge pipe.

The dam is classified as SMALL and has HIGH hazard potential in accordance with guidelines established by the Corps of Engineers. The test flood according to these guidelines ranges from 1/2 the Probable Maximum Flood (PMF) to the PMF.

The test flood for this dam is 1/2 the PMF and is calculated to be 560 cfs. The spillway capacity at the top of the dam is 250 cfs or 45 percent of the test flood outflow. The test flood outflow will overtop the dam by 1.1 feet.

It is recommended that the owner engage the services of a qualified registered engineer experienced in the design of dams to investigate the seepage through the dam, supervise the removal of trees on the downstream embankment and along the toe of the dam, prepare a detailed hydraulic/hydrologic study to determine the spillway's adequacy and determine the water main's potential use as a low-level discharge pipe. It is also recommended that the owner remove brush from the embankment, clear the spillway channel of debris, repair all joints and cracked concrete, establish a formal warning system and initiate an annual technical inspection program.

The owner should implement the recommendations and remedial measures described above and in greater detail in Section 7 within one year after receipt of this Phase I Inspection Report.

Joseph F. Merluzzo
Connecticut P.E. #7639
Project Manager

Gary J. Giroux
Connecticut P.E. #11477
Project Engineer

This Phase I Inspection Report on Black Pond Dam (CT-00135) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Inspections. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Inspection is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Inspection; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the Spillway Test Flood is based on the estimated Probable Maximum Flood for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and variety of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Inspection does not include an assessment of the need for fences, gates, "no trespassing" signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with Occupational Safety and Health Administration's (OSHA) rules and regulations is also excluded.

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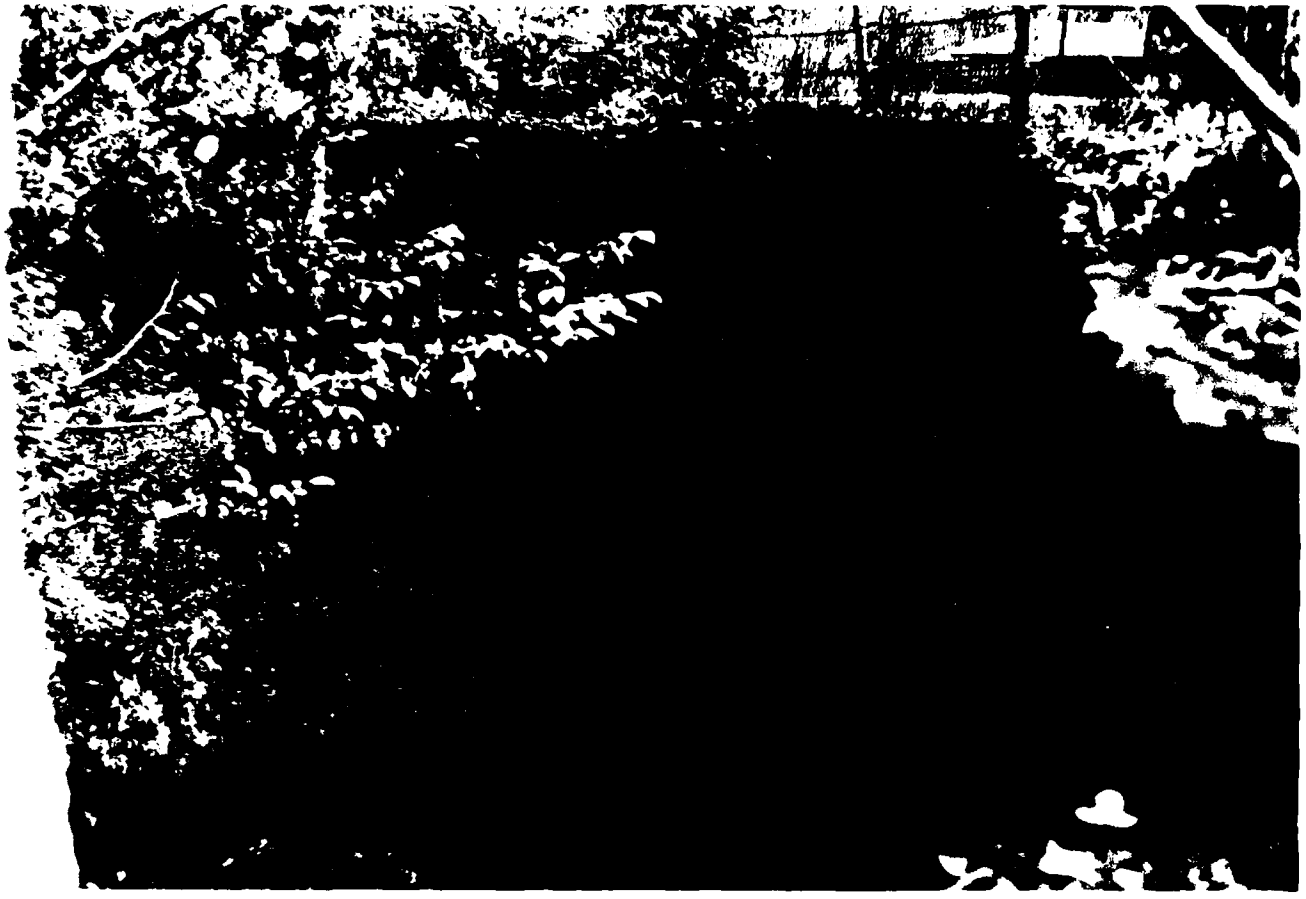
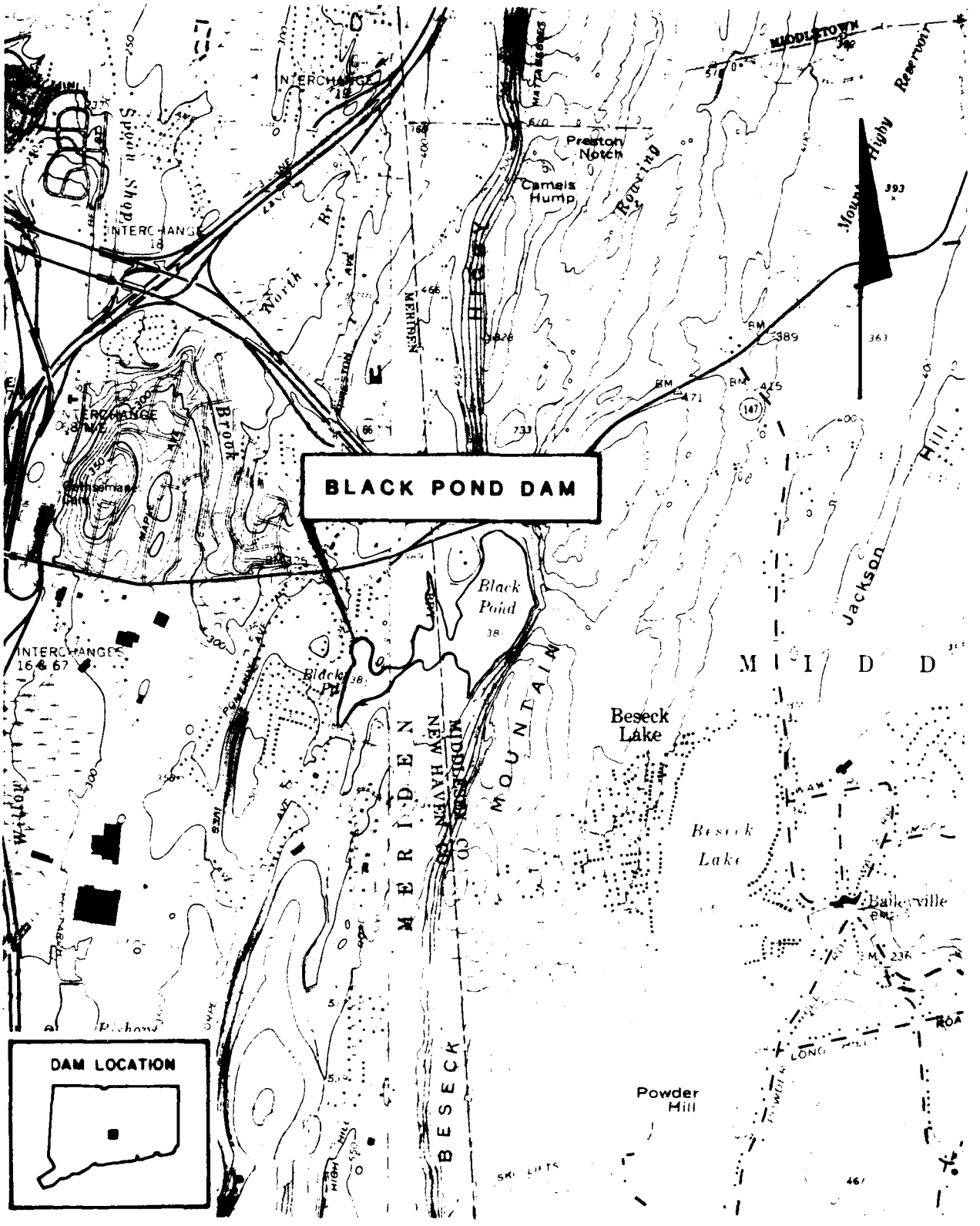


BLACK POND DAM



QUADRANGLE: MERIDEN/MIDDLETOWN, CT

US ARMY, CORPS OF ENGINEERS
NEW ENGLAND DIVISION
WALTHAM, MASS.

SCALE IN FEET
2000' 0 2000' 4000'
1" = 2000'

LOCATION MAP

PHASE I INSPECTION REPORT

BLACK POND DAM CT 00135

SECTION 1 - PROJECT INFORMATION

1.1 General

a. Authority - Public Law 92-367, August 8, 1972 authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspections throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Storch Engineers has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Storch Engineers under a letter of October 30, 1980 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-80-C-0035 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection -

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and prepare the states to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location - Black Pond Dam is located in the City of Meriden, New Haven County, Connecticut. Thorpe Avenue follows the western edge of the Pond and Birdsey Avenue runs along the crest of the dam. About 1,000 feet downstream,

the brook passes under the intersection of East Main Street, Route 6A and Preston Avenue. The dam is located on Spoon Shop Brook in the Quinnipiac River Basin. The coordinates of the dam are approximately 41°-31.39' north latitude and 72°-45.11' west longitude.

b. Description of Dam and Appurtenances - Black Pond Dam is a stone masonry and earth embankment dam with a paved road crest. It is approximately 100 feet long and 26 feet high. The downstream face is vertical and consists of uncoursed rubble sandstone with most of the mortar missing. The upstream earthen face is below the pond surface and its slope cannot be determined. The top of the dam is approximately 25 feet wide.

The spillway is located slightly west of the center of the dam and is 14 feet long. It is a 3-foot high concrete culvert under Birdsey Avenue. Vertical bars, at 1 foot spacings on the upstream side of the spillway culvert and used to prevent debris from clogging inside.

There is a mortared stone masonry gate inlet structure. The gate valve controls a 20-inch cast iron water main. There is no low-level discharge pipe passing through the dam.

c. Size Classification - Black Pond Dam has a maximum height of 26 feet and a maximum capacity of 353 acre-feet at the top of the dam. In accordance with the Recommended Guidelines for Safety Inspection of Dams established by the Corps of Engineers, the dam is classified as SMALL (height less than 40 feet, storage less than 1,000 acre-feet).

d. Hazard Classification - Black Pond Dam is classified as having a HIGH hazard potential. Failure to the dam could result in the loss of more than a few lives an cause significant property damage. Approximately 700 feet downstream, the flood wave would strike two houses. The first floor sills of the

houses are approximately 3 and 6 feet above the streambed respectively. Estimated flows and water depths at this location just prior to dam failure is 250 cfs and 3.5 feet and just after dam failure is 5,390 cfs and 10 feet. Therefore, the water level would rise approximately 7.4 and 4.4 feet above the first floor sills respectively.

e. Ownership - Black Pond Dam is owned by:

The City of Meriden
City Hall
Meriden, Connecticut 06450
(203) 634-0003

f. Operator - Operating personnel are under the direction of:

Mr. J. Bruce Marks, Director
Physical Services
City of Meriden
City Hall
Meriden, Connecticut 06450
(203) 634-0003

g. Purpose of Dam - The original function of the dam was for water supply. Presently, the pond is used for recreational purposes. If necessary, the water main running through the dam could be activated for water supply.

h. Design and Construction History - Black Pond Dam was constructed around 1880. No information is available on the original design or construction of the dam. The road and box culvert were built after 1950 and parts of the dam were grouted in 1966 to stop seepage.

i. Normal Operating Procedures - Water level in Black Pond is controlled by flow over the spillway. The water main is not in use and the gate was not operated.

1.3 Pertinent Data

a. Drainage Area - The Black Pond drainage basin is located in the City of Meriden and the Town of Middlefield, Connecticut and is irregular in shape. The area of the drainage basin is 1.2 square miles (Appendix D - Plate 3).

Approximately 20 percent of the drainage basin is natural storage and about 80 percent is undeveloped. The topography is hilly with a steep ridge along the eastern edge of the basin. Elevations range from 828 (NGVD) to 381 (NGVD) at the spillway crest.

b. Discharge at Damsite - There are no records available for discharge at the dam.

(1)	Outlet works (conduit) size:	20 inch
	Invert elevation (feet above NGVD):	362
	Discharge Capacity at top of dam:	12 cfs
(2)	Maximum known flood at damsite:	unknown
(3)	Ungated spillway capacity at top of dam:	250 cfs
	Elevation (NGVD):	385.0
(4)	Ungated spillway capacity at test flood elevation:	420 cfs
	Elevation (NGVD):	386.1
(5)	Gated spillway capacity at normal pool elevation:	N/A
	Elevation (NGVD):	N/A
(6)	Gated spillway capacity at test flood elevation:	N/A
	Elevation:	N/A
(7)	Total Spillway capacity at test flood elevation:	420 cfs
	Elevation (NGVD):	386.1
(8)	Total project discharge at top of dam:	262 cfs
	Elevation (NGVD):	385.0

(9)	Total project discharge at test flood elevation:	560
	Elevation (NGVD):	386.1
c.	Elevation (feet above NGVD)	
(1)	Streambed at toe of dam:	359.0
(2)	Bottom of cutoff:	unknown
(3)	Maximum tailwater:	362.5
(4)	Normal pool:	381.0
(5)	Full flood control pool:	N/A
(6)	Spillway crest (ungated):	381.0
(7)	Design surcharge (original design):	unknown
(8)	Top of dam:	385.0
(9)	Test flood surcharge:	386.1
d.	Reservoir (length in feet)	
(1)	Normal pool:	1,400
(2)	Flood control pool:	N/A
(3)	Spillway crest pool:	1,400
(4)	Top of dam:	1,500
(5)	Test flood pool:	1,480
e.	Storage (acre-feet)	
(1)	Normal pool:	123
(2)	Flood control pool:	N/A
(3)	Spillway crest pool:	123
(4)	Top of dam:	353
(5)	Test flood pool:	308
f.	Reservoir Surface (acres)	
(1)	Normal pool:	11

	(2) Flood control pool:	N/A
	(3) Spillway crest:	11
	(4) Test flood pool:	57
	(5) Top of dam:	58
g.	Dam	
	(1) Type:	stone masonry earth embankment
	(2) Length:	100 feet
	(3) Height:	26 feet
	(4) Top width:	25 feet
	(5) Side slopes:	vertical at masonry downstream portion; unknown at earthen upstream portion
	(6) Zoning:	unknown
	(7) Impervious Core:	unknown
	(8) Cutoff:	unknown
	(9) Grout curtain:	unknown
	(10) Other:	N/A
h.	Diversion and Regulating Tunnel	N/A
i.	Spillway	
	(1) Type:	masonry broad crested weir with concrete cap
	(2) Length of weir:	14 feet
	(3) Crest elevation	381.0
	(4) Gates:	N/A
	(5) U/S Channel	none

(6)	D/S Channel:	rubble splash pad and natural channel
(7)	General:	N/A
j.	Regulating Outlets	
(1)	Invert Elevation (NGVD)	362.0
(2)	Size:	20 inch
(3)	Description:	C.I. water main
(4)	Control Mechanism	Gate on the upstream side
(5)	Other:	The water main is presently not in use

SECTION 2 - ENGINEERING DATA

2.1 Design Data

No original design computations or drawings are available for this dam.

2.2 Construction Data

The dam was constructed around 1880. No original construction drawings or data are available for this dam. The road and box culvert over the spillway were built around 1950 and internal grouting to stop seepage was done in 1966. Drawings from a 1963 report are reprinted in this report and reconstruction plans for the above mentioned projects are available at the City of Meriden Engineering Department.

2.3 Operation Data

The pond was used as a water supply but is not used as such any more. The water main leaks the gate could not be operated. There is no low-level discharge facility.

2.4 Evaluation of Data

a. Availability - No original design or construction data are available for this dam, although reconstruction data are available. No operation data are available.

b. Adequacy - The information made available along with a visual inspection and hydraulic /hydrologic assumptions were adequate to assess the condition of the facility.

c. Validity - The conclusions and recommendations found in this report are based on a visual inspection, hydraulic/hydrologic computations and available data.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

a. General - A visual inspection was conducted on October 21, 1980 by members of the engineering staff of Storch Engineers, D. Baugh and Associates, Inc. and Matthews Associates. A copy of the visual inspection checklist is contained in Appendix A of this report. Selected photos of the dam are contained in Appendix C.

In general, the overall condition of the dam and its appurtenant structures is FAIR.

b. Dam - The dam is a stone masonry and earth embankment structure with a paved road along the crest. The downstream face is stone masonry as shown in the Overview Photo. Nearly all the joints need repointing. Seepage occurs at two locations at the base of the dam with a combined rate of approximately 4 gallons per minute (Photos 4 and 5 - See Photo Location Plan - Plate 3 for Location). The water main is also leaking at a rate of approximatley 14 gallons per minute (Photo 6). All seepage is clear and shows no sign of particle movement. Several 1 to 2-foot diameter trees are growing on the upstream face and adjacent to the downstream face (Photos 1 and 2). A 6-inch diameter tree is rooted in the downstream masonry face.

The road along the crest of the dam is in good condition. There is no sign of settlement.

c. Appurtenant Structures - The spillway is enclosed in a concrete culvert running under Birdsey Avenue (Photos 1, 2 and 3) that has a 3foot high by 14 foot wide opening and is 25 feet long. The spillway weir consists of a concrete slab that is spalling at the downstream face. The entrance to the concrete spillway culvert has vertical bars spaced 1 foot apart (Photo 3).

There is a mortared stone masonry gate inlet structure next to the spillway on the upstream side of the embankment (Photo 7). The structure is poorly fenced and can be entered. There is a bar rack at the inlet and a manually operated gate. The gate controls a 20-inch cast iron water main that is no longer used for water supply. A leak exists near the downstream face where the pipe passes through the dam. The pipe continues along the downstream channel and connects to the City's distribution system.

d. Reservoir Area - The area immediately adjacent to the pond is wooded and gently sloping (Photo 10). The shoreline shows no signs of sloughing or erosion. A rapid rise in the water level of the pond will not endanger life or property.

e. Downstream Channel - The downstream channel is mostly natural and comprised of rocks and gravel. A 2-foot high stone wall runs along the east bank for about 100 feet. The area adjacent to the downstream channel is heavily overgrown with brush and trees (Photo 9). Immediately below the spillway is a pile of rocks and branches about 5 feet high (Photo 8).

3.2 Evaluation

Overall, the general condition of the dam is FAIR. The visual inspection revealed items that lead to this assessment, such as:

a. Seepage through the base of the dam;

b. Missing mortar and poor condition of joints;

c. Trees growing on the upstream and downstream side of the embankment and along the toe;

d. Brush and debris along the toe of the dam;

e. Spalling of the spillway weir;

f. Leaking of the water main;

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General - The operation of this facility was for water supply but it is no longer used for this purpose. If necessary, it could be used again to supply water; however, the water main leaks.

b. Description of Any Warning System in Effect - There is no formal warning system in effect for this dam.

4.2 Maintenance Procedures

a. General - There is no specific maintenance program for this dam, however, an inspection was done in 1963 and seepage was repaired in 1966.

b. Operating Facilities - There is a water main and a gate inlet structure which are no longer used. The water main connects to the City's distribution network.

4.3 Evaluation

There is no regularly scheduled maintenance program. A systematic and complete maintenance program should be instituted at the dam and a formal warning system should be developed.

SECTION 5 - EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Black Pond Dam is a stone masonry and earth embankment dam approximately 100 feet long and 25 feet high with a paved road crest 25 feet wide. The downstream face consists of vertical stone masonry. The spillway is a 14 foot by 3 foot concrete culvert underneath Birdsey Avenue. A gate inlet structure next to the spillway controls a 20-inch cast iron water main that is no longer used.

The watershed encompasses 1.2 square miles and is approximately 80 percent undeveloped. The topography is hilly with terrain rising to 447 feet from the spillway crest.

The pond has a total capacity of approximately 123 acre-feet at the spillway crest and approximately 353 acre-feet when the pond is at the top of the earth embankment.

5.2 Design Data

No design data for the original dam is available. Independent computations for this dam were developed and used for this report.

5.3 Experience Data

No historical data for recorded discharges or water surface elevations are available for this dam, however, the dam has withstood the past major floods such as; March 1936, September 1938 and August 1955 as well as the more recent floods of January and February 1978 and January 1979. According to the U.S.G.S. the flood of record for this area occurred in September 1938.

5.4 Test Flood Analysis

Based on the Recommended Guidelines for Safety Inspection of Dams, the dam is classified as a SMALL structure with a HIGH hazard potential. The test flood

for these conditions ranges from 1/2 the Probable Maximum Flood (PMF) to the PMF. One-half the PMF was used because of the dam's small size.

Using guide curves established by the Corps of Engineers (rolling terrain), the test flood inflow is 1,440 cfs. The routing procedure established by the Corps' guidelines gives an approximate outflow of 560 cfs. The spillway capacity of the dam is approximately 250 cfs or 45 percent of the routed test flood outflow. The test flood will overtop the dam by 1.1 feet.

The water in the pond is basically uncontrolled and therefore the storage behind the dam was assumed to begin at the elevation of the spillway crest. Storage was determined by an average area depth analysis and storage volume between the spillway crest and the top of dam includes the upper pond. Capacity curves for the spillway assumed a broad crested weir.

5.5 Dam Failure Analysis

A dam failure analysis was performed using the Rule of Thumb method in accordance with guidelines established by the Corps of Engineers. Failure was assumed to occur when the water level in the pond was at the top of the dam.

The spillway discharge just prior to dam failure is 250 cfs and the calculated dam failure discharge is 5,575 cfs.

Failure of Black Pond dam could result in the loss of more than a few lives and cause significant property damage. Approximately 700 feet downstream, the flood wave could strike two houses. The first floor sills of the houses are approximately 3 and 6 feet above the streambed respectively. Estimated flow and water depth at this location just prior to dam failure is 250 cfs and 3.5 feet and just after dam failure is 5,390 cfs and 10 feet. Therefore, the water level would rise approximately 7.4 and 4.4 feet above the first floor sills respectively.

SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

The general structural stability of the dam is fair as evidenced by its vertical, horizontal and lateral alignment. Most of the stone masonry joints need repointing. Trees are growing on the upstream and downstream side of the embankment. The concrete spillway weir is spalling. Seepage occurs along the toe of the dam.

6.2 Design and Construction Data

The dam was constructed around 1880. No information is available on the original design or construction of the dam, although reconstruction data is available.

6.3 Post-Construction Changes

The road and spillway culvert were built around 1950 and portions of the dam were grouted in 1966 to stop seepage.

6.4 Seismic Stability

The dam is located in Seismic Zone 1 and in accordance with Recommended Phase I Guidelines does not warrant a seismic analysis.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition - After considering the available information, the results of the inspection, contacts with the owner and hydraulic/hydrologic computations, the general condition of the Black Pond Dam is FAIR.

b. Adequacy of Information - The information available is such that an assessment of the safety of the dam was based on the available data, the visual inspection results and computations developed for this report.

c. Urgency - It is considered that the recommendations and remedial measures suggested below should be implemented within one year after receipt of this Phase I Inspection Report.

7.2 Recommendations

The following recommendations should be carried out under the direction of a qualified registered engineer.

a. Seepage through the dam should be investigated further to determine its origin and monitored to determine any changes;

b. Trees, including stumps and root systems, should be removed from the upstream embankment, downstream face and within 20 feet of the toe of the dam and backfilled with proper material;

c. The leaking water main should be repaired and its potential as a low-level discharge should be investigated;

d. Perform a detailed hydraulic/hydrologic investigation to assess further the potential of overtopping the dam and the need for and the means to increase project discharge capacity.

7.3 Remedial Measures

a. Operation and Maintenance Procedures -

(1) Remove all brush and debris from the earth embankment, downstream face of the dam and within 20 feet of the toe of the dam.

(2) Clear the downstream channel of debris.

(3) Repair all joints and cracked and spalled concrete.

(4) Institute a program of annual technical inspection by a qualified Engineer.

(5) Develop plans for around-the-clock surveillance for periods of unusually heavy rains and institute a formal downstream warning system for use in the event of an emergency.

7.4 Alternatives

There are no practical alternatives to the above recommendations.

APPENDIX A

INSPECTION CHECK LIST

INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Black Pond Dam

DATE 10/21/80

TIME 1:00 p.m.

WEATHER Overcast 60°F

W.S. ELEV.____ U.S.____ DN.S.

PARTY:

1. Gary Giroux, SE, Hyd./Struct
2. Floyd Austin, DBA, Civil
3. Mike Pozzato, MA, Mech.
4. Ben Cohen, SE, Civil
5. Ken Pudeler, SE, Civil
6.
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Dam Embankment	K. Pudeler F. Austin	Fair
2.	Mechanical	M. Pozzato	Condition Unknown
3.	Spillway	G. Giroux B. Cohen	Good
4.	Discharge Channel	G. Giroux B. Cohen	Fair
5.			
6.			
7.			
8.			
9.			
10.			

INSPECTION CHECK LIST

PROJECT Black Pond Dam DATE 10/21/80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	385.0 (NGVD)
Current Pool Elevation	380.5 (NGVD)
Maximum Impoundment to Date	Unknown
Surface Cracks	None
Pavement Condition	Good
Movement or Settlement of Crest	None
Lateral Movement	None
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Wash out of grout on downstream face
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	Unknown
Vegitation on Slopes	Some large trees (1-2 feet)
Sloughing or Erosion of Slopes or Abutments	None
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or near Toes	None
Unusual Embankment or Downstream Seepage	General locations approximately
Piping or Boils	Some leakage through dam
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

INSPECTION CHECK LIST

PROJECT Black Pond Dam DATE 10/21/80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	Underwater
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	
Condition of Concrete	Fair
Stop Logs and Slots	Fair

INSPECTION CHECK LIST

PROJECT Black Pond Dam DATE 10/21/80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	N/A
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	Condition and operation unknown
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System in Gate Chamber	

INSPECTION CHECK LIST

PROJECT Black Pond Dam DATE 10/21/80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	N/A
General Condition of Concrete	
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

INSPECTION CHECK LIST

PROJECT Black Pond Dam DATE 10/21/80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Underwater
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Several Large Trees
Floor of Approach Channel	Not visible
b. Weir and Training Walls	
General Condition of Concrete	Fair
Rust or Staining	None
Spalling	Some on spillway box and concrete weir
Any Visible Reinforcing	No, but bars for vandalism are rusting
Any Seepage or Efflorescence	None
Drain Holes	
c. Discharge Channel	
General Condition	Fair, filled with 5' of rubble
Loose Rock Overhanging Channel	Old stone works are falling apart
Trees Overhanging Channel	Yes, some up to 36"
Floor of Channel	Cluttered with rocks and wood
Other Obstructions	

INSPECTION CHECK LIST

PROJECT Black Pond Dam DATE 10/21/80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	N/A
General Condition of Concrete	
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	
Channel	
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	

INSPECTION CHECK LIST

PROJECT Black Pond Dam DATE 10/21/80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	N/A
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

APPENDIX B

ENGINEERING DATA

Any information pertaining to the history, maintenance and past inspection reports are located at:

State of Connecticut
Department of Environmental
Protection
Water Resources Unit
State Office Building
Hartford, Connecticut 06115

A. M. McKENZIE
CIVIL ENGINEER
M. AM. SOC. C. E.
1300 MAIN STREET
SOUTH MERIDEN, CONN.

October 3, 1963.

Water Resources Commission,
State of Connecticut,
State Office Building,
Hartford, 15,
Connecticut.

Black Pond,
Meriden.
Ref: QU 23.4-HR 4.6-SS2.8
U.S.C & G. Topo Map
Meriden Quad.
Owner - City of Meriden.

Gentlemen:

2A. The Black Pond Dam, from what can be seen of the downstream face is in good condition. There are two visible leaks thru the dam, at the ground line on the west side, and about 12' below the top. There may be other leaks lower down - the downstream face of the dam is partly covered by brush and rubbish which has been thrown into the valley covering the base of the dam at the center. The quantity of water leaking thru the dam might fill a 6"ø pipe; there was no other discharge from the pond on this date. Leakage does not seem serious at this time.

The failure of the dam under any condition could have serious results. About 850' downstream the valley is completely blocked by East Main Street and just below that is another fill across the valley - Route #6. The only opening thru these fills is a 48"ø R.C.P. culvert which could take only a small part of the discharge from the pond in case the dam washed out. The valley above East Main would immediately fill up and overflow onto Route #6, running west thru a well built-up area.

The failure of the dam at any time might well endanger life; the overflow would be onto a main highway, heavily traveled, and thru a well built-up section of the city.

3. The only part of the dam which can be seen is the downstream face which is of uncoursed rubble sandstone, originally built with mortar joints, tho much of the mortar has fallen out. The face is sloped back somewhat and in reasonably good line. Birdsey Street runs over the top of the dam and the upstream face is completely covered by the silt in the bottom of the pond. The dam foundation might be ledge rock - there is no way of determining that without taking borings.

The spillway is a rectangular, box culvert of concrete, passing under Birdsey St. Size is 3' x 14' with vertical bars across the intake. See photos. The length is 25' overall.

3. (cont.)

The spillway, without the bars, and flowing full, would have a capacity of about 330 c.f.s. With the bars in place across the entrance (see photo) the capacity might be anything between 0 and the maximum, depending upon the amount of rubbish which the bars would pick up.

If the freeboard is not sustained flow would occur over the roadway and the top of the dam - this might not be too dangerous if the flow over the road was only a few inches in depth.

Leaks as mentioned previously; on the west side of downstream face at the ground surface - flow is only a fraction of a c.f.s. No cracks, displacement or erosion noted. In some small areas the mortar has fallen from the joints and the stone has spalled a little.

4. The drainage area is about 0.4 sq. mi.; the east side ofthe pond having a steep and rocky slope and the west side a medium slope with some built-up parts.

The maximum flood discharge might be anywhere from 300 c.f.s./sq. mi. to over 1000 c.f.s./ sq. mi.

Any flood discharging over 300 c.f.s. would be dangerous. The size and capacity of the drain thru the dam is not known nor the condition of the gate on the upper end.

5. The dam does not appear to be in an unsafe condition at the present time. The leaks mentioned above have been there for a number of years without much change in the volume of water passing thru them.

Until the leakage is stopped the dam should be inspected periodically - perhaps once a year, to observe the leaks.

6. To correct the defects in the dam as it stands at present will require stopping the leaks thru the dam and removal of the bars across the inlet of the box culvert which forms the spillway. Grouting or whatever other method is used to stop the leaks can best be done when temperatures are above freezing and when the water level is normal or below.

No immediate action seems to be required as there is no great hazard.

When repairs are being made it would be well to point up all the joints in the stone work with cement mortar, first carefully cleaning them out. Also, the brush and rubbish dumped over the downstream face should be removed.

7. & 8. At the present the dam cannot be called a hazard to either life or property; an unusual flood might well make it a hazard. It appears to the writer that the leaks thru the dam could be stopped by simple cement grouting. Removing the bars across the intake is no problem at all.

9. An order should be issued to the owner requiring the following work to be done:

1. Stop the leaks thru the stone masonry by grouting or other means.
2. Remove the steel bars across the spillway opening.
3. Remove the brush and rubbish from the downstream face of the dam and take steps to prevent it's accumulating there again.

This work could be done before the first of December of this year or at any other time when weather condition and water level permits. Removing the steel bars and cleaning below the dam should be done at once. The grouting before December 1, 1963.

Yours very truly

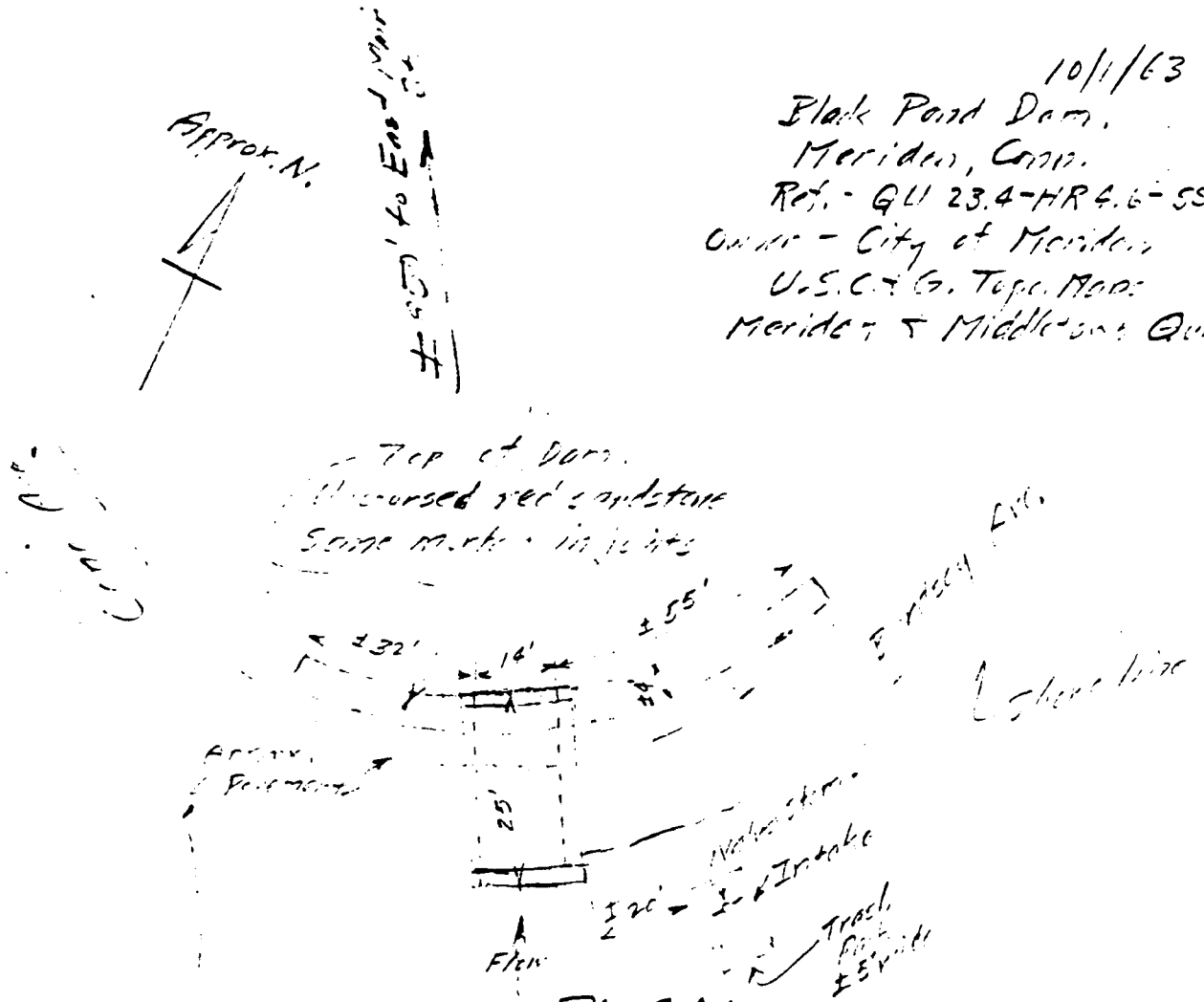
A. M. McKenzie

Enclosures 3 - Photographs.

2 - Sketches.

10/1/63

Black Pond Dam.
Meriden, Conn.
Ref. - QU 23.4-HR 4.6-SS 2.8
Owner - City of Meriden
U.S.C.&G. Topo. Map:
Meriden & Middletown Quads.

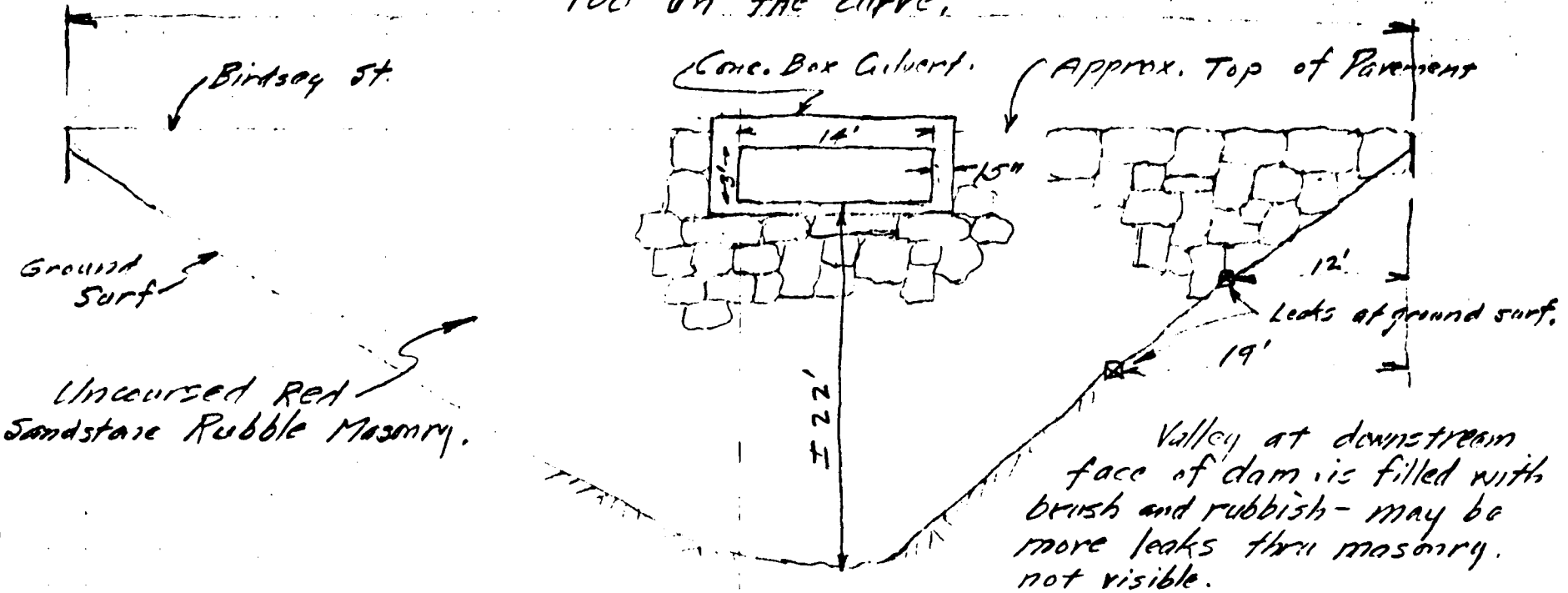


Upstream Elev. of Conc. Box Culvert under Birdsey Ave.

Leaks thru dam are on west side of spillway - at ground surface and about 10'-12' below top of dam.

Top of dam is about same elevation as street.

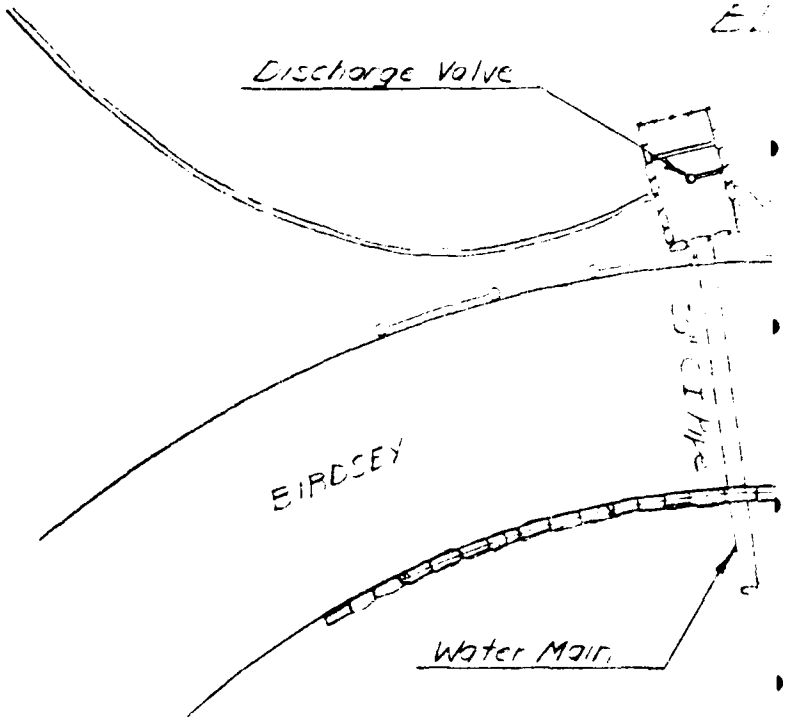
100' on the curve.

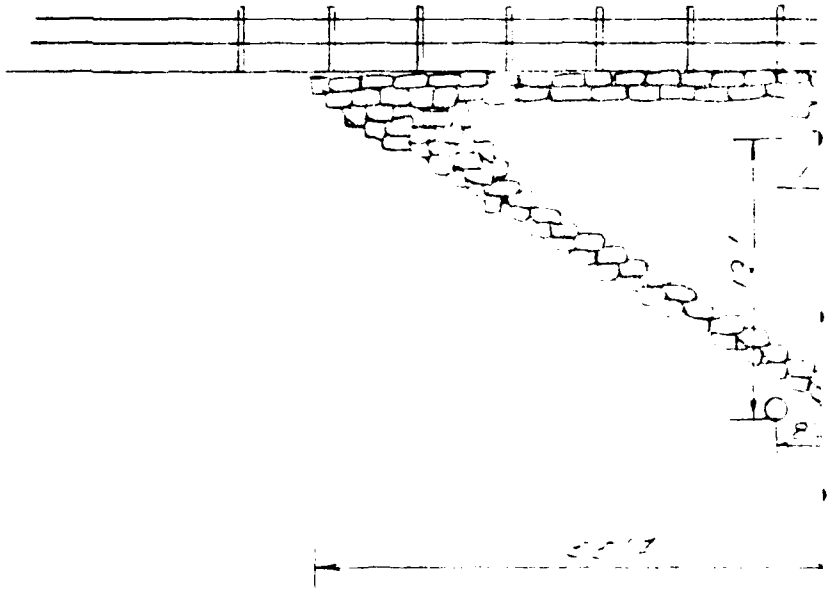


B-6

Downstream Elevation of Dam.

Plate Pond Dam
Meriden,
Ref: QU 234 - HAER - 552.8
Owner - City of Meriden.





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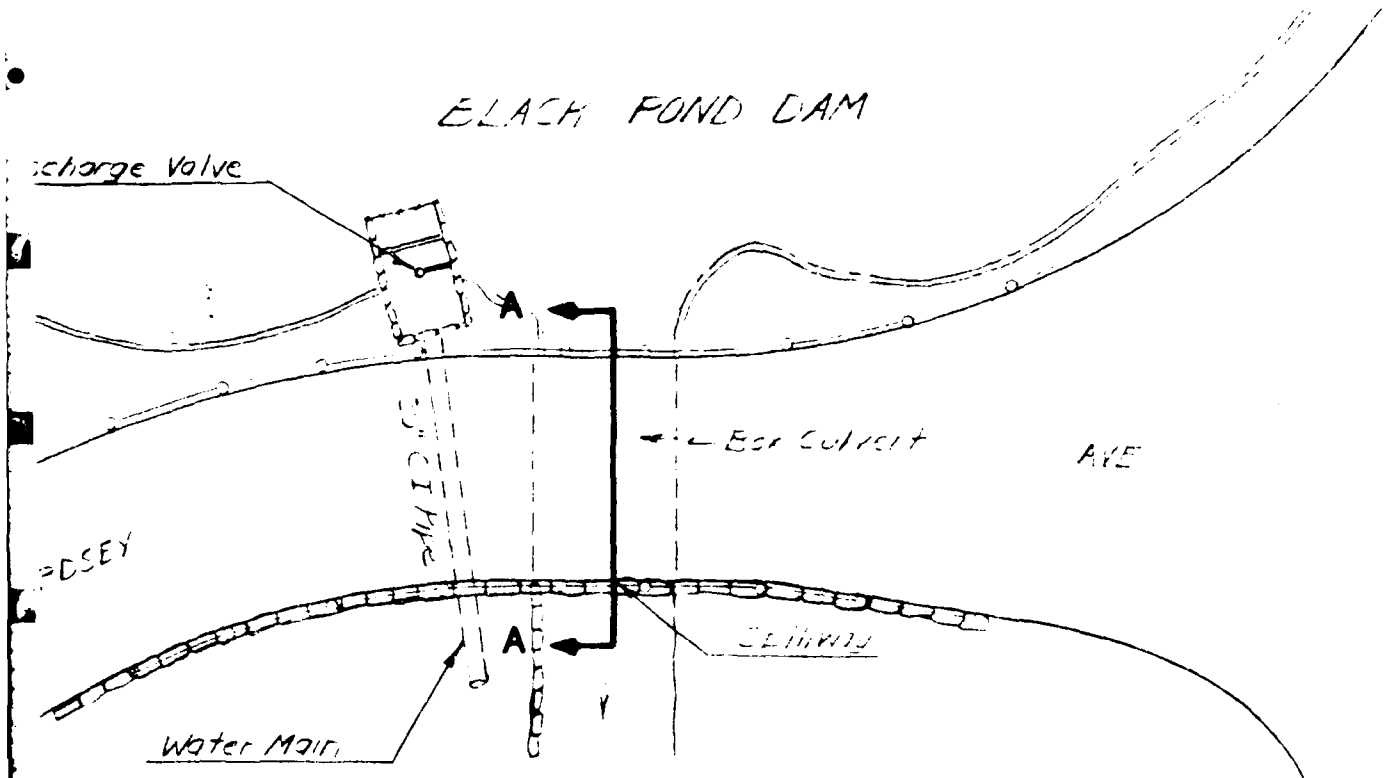
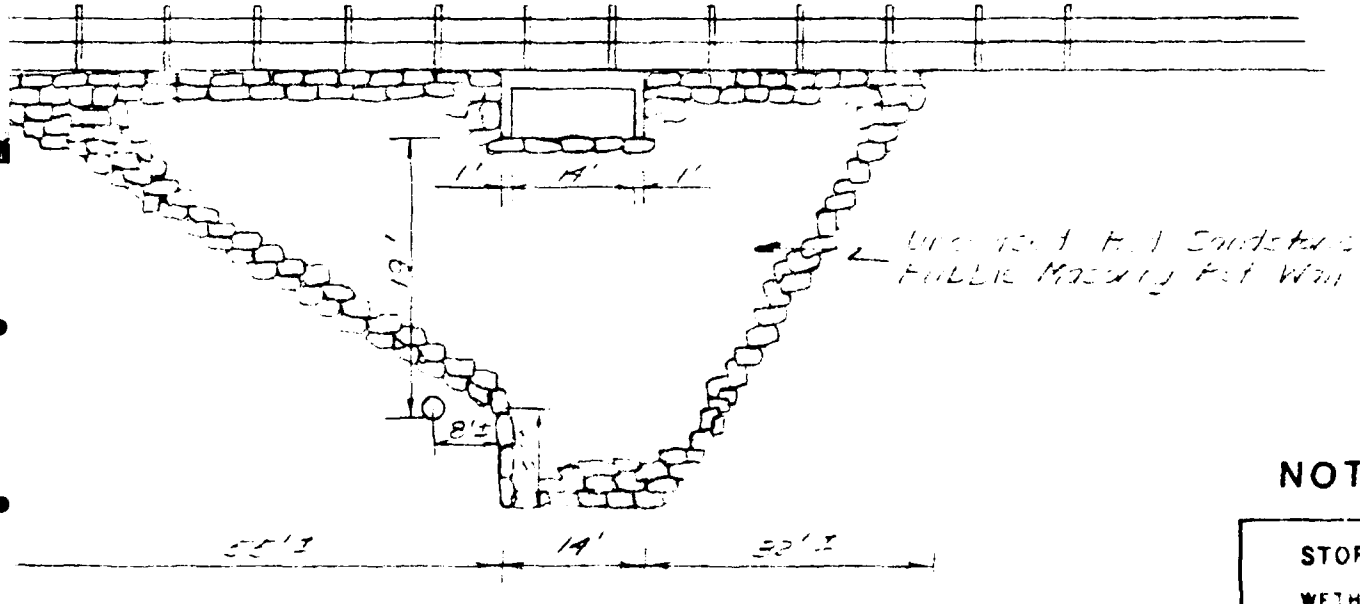


PLAN



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WETHERSFIELD, CONN

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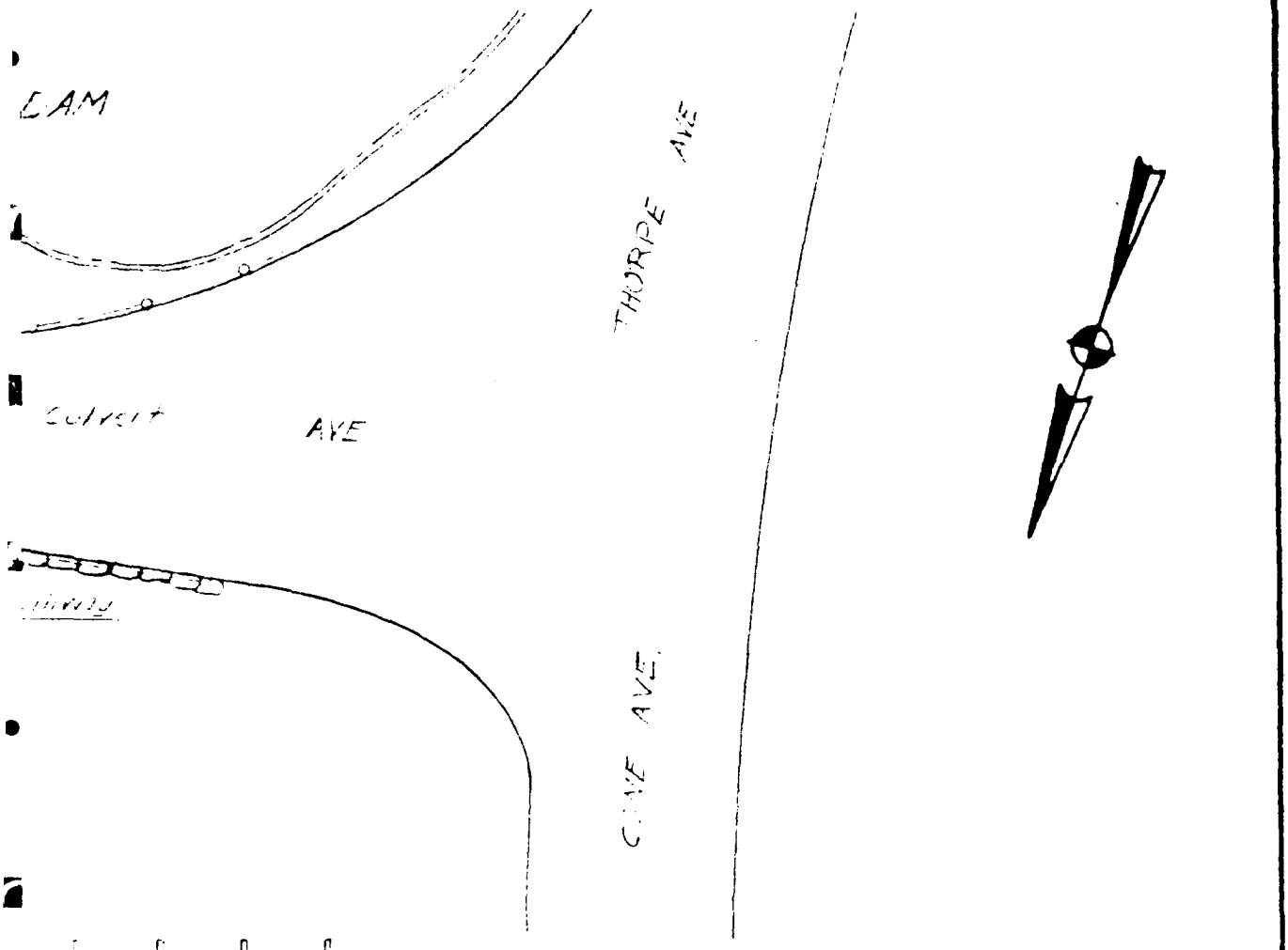


NOT TO SCALE

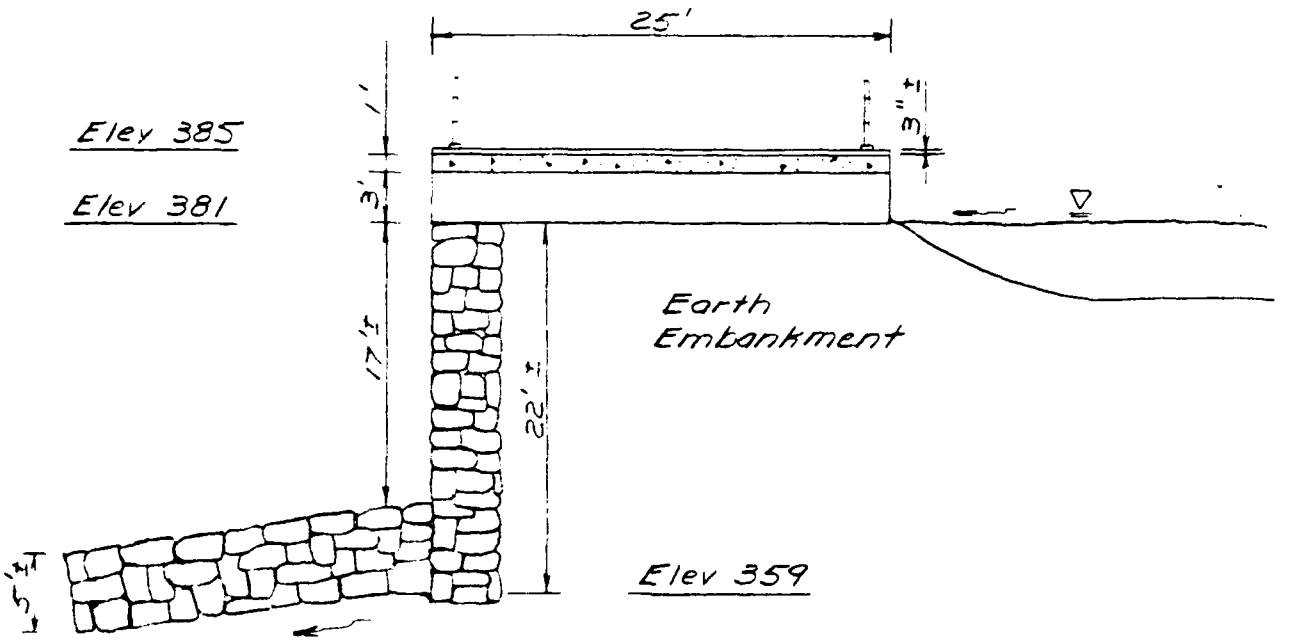
PLATE 1

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

BLACK POND DAM

			SCALE AS SHOWN
			DATE FEBRUARY 1981



SECTION A-A

PLATE 2

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	U S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM MASS

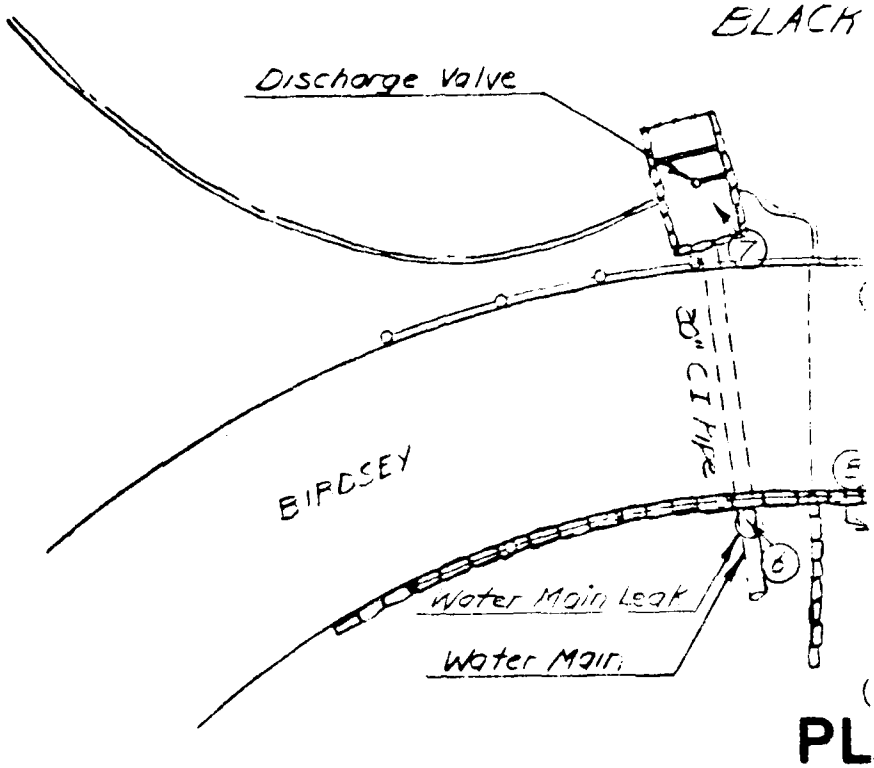
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

BLACK POND DAM

NOT TO SCALE

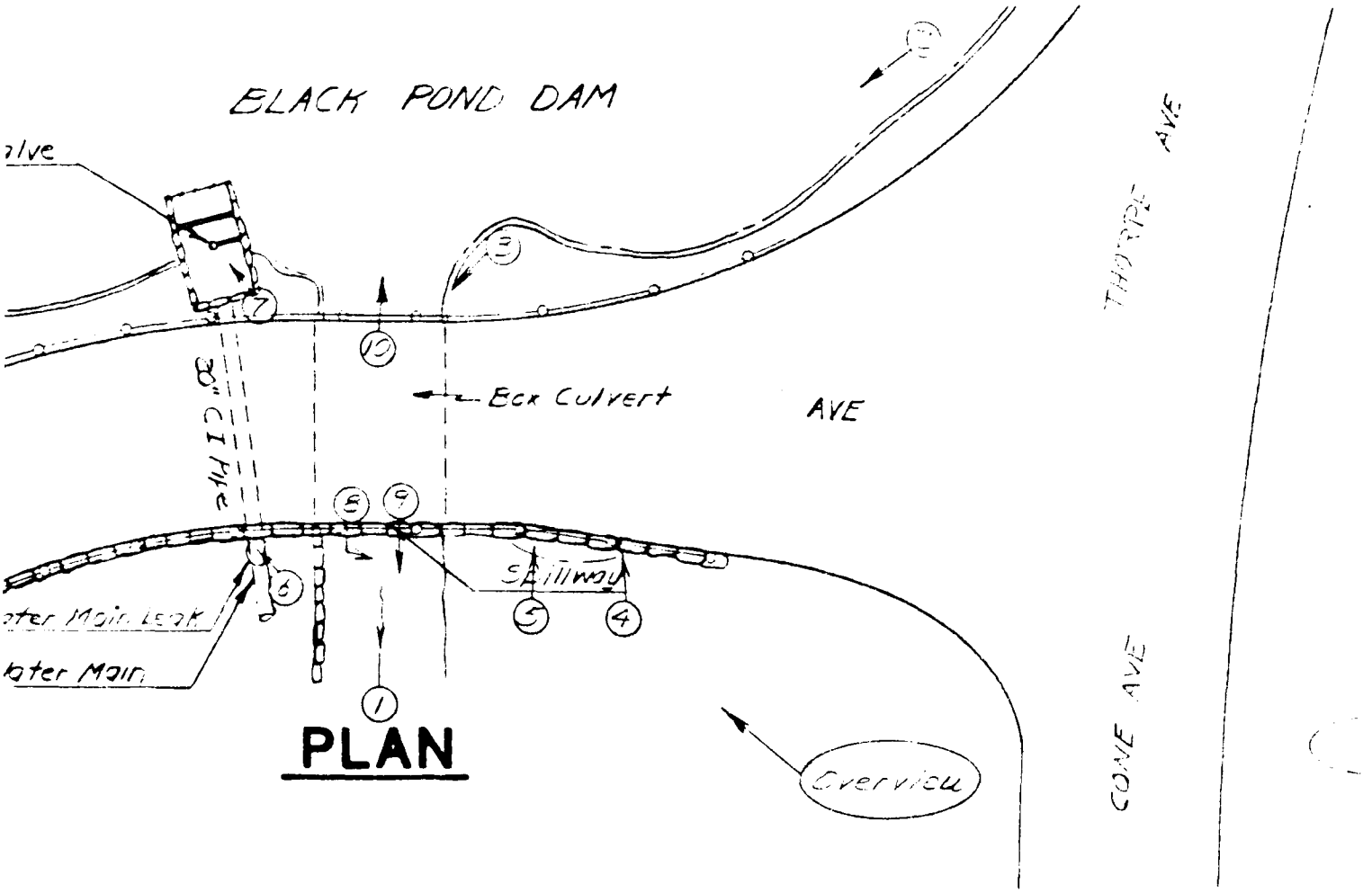
SCALE: AS SHOWN

DATE: FEBRUARY 1981


BLACK
Discharge Valve
30" CI Pipe
BIRDSEY
Water Main Leak
Water Main

PL

① Plate 2



PLAN

NOT TO SCALE

PHOTO LOC

STORCH ENGINEERS
WETHERSFIELD, CONNECTI
NATIONAL PROGRAM
BLAC

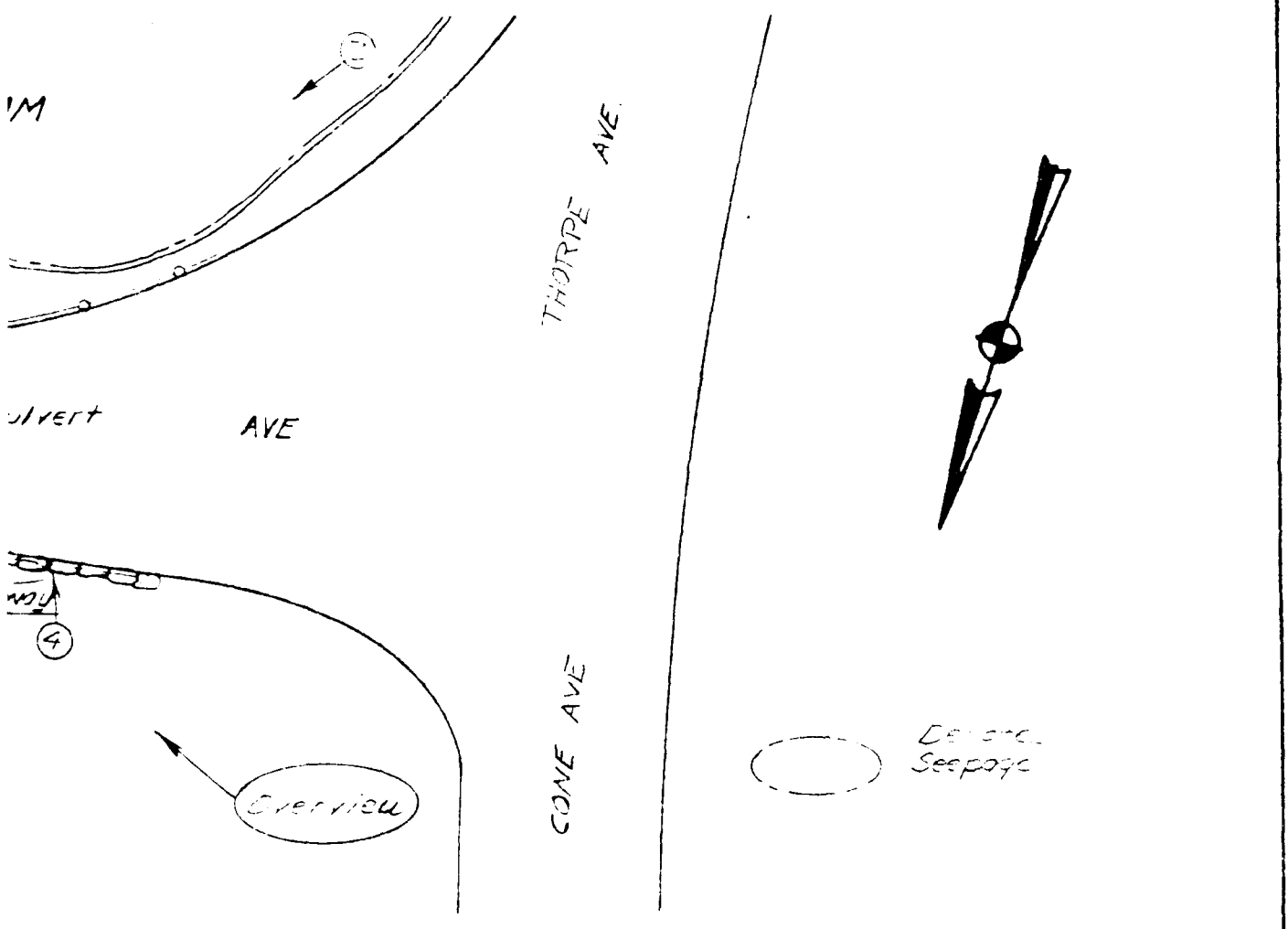


PHOTO LOCATION PLAN

PLATE 3

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

BLACK POND DAM

3

NOT TO SCALE

SCALE: AS SHOWN

DATE: FEBRUARY 1981

APPENDIX C

PHOTOGRAPHS

PHOTO 1

DOWNSTREAM FACE OF DAM

PHOTC 2

UPSTREAM FACE OF DAM

PHOTO 3

INLET - SPILLWAY BOX

PHOTO 4

SEEPAGE - DOWNSTREAM FACE OF DAM

PHOTO 5

SEEPAGE - DOWNSTREAM FACE OF DAM

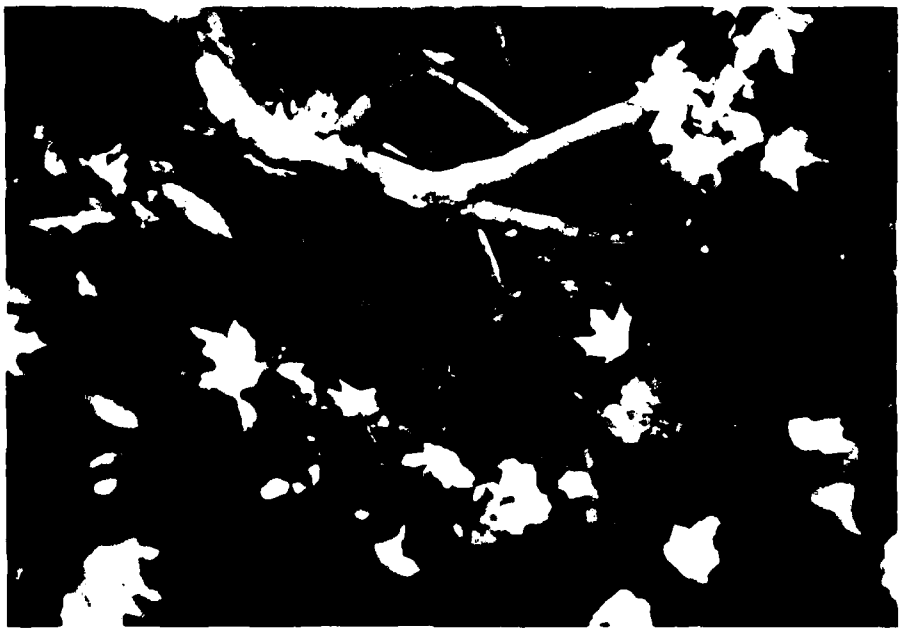


PHOTO 6

SEEPAGE - WATER MAIN

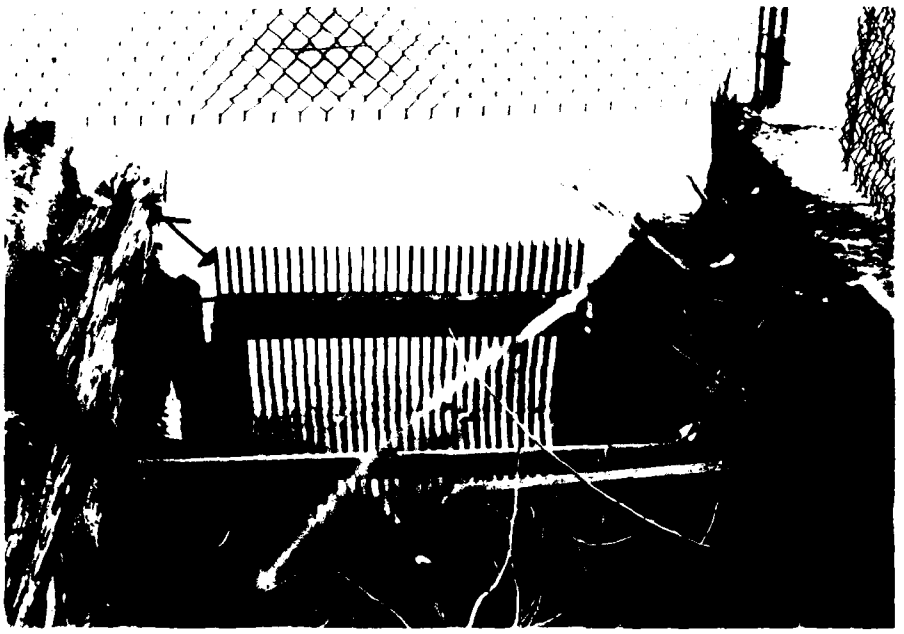


PHOTO 7

INLET STRUCTURE - WATER MAIN

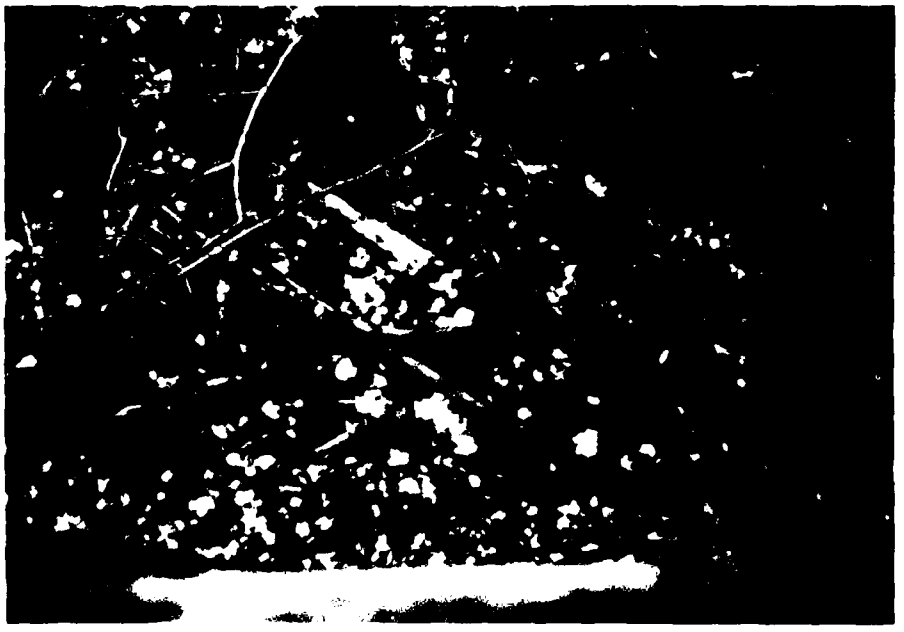


PHOTO 8

DEBRIS BELOW SPILLWAY

PHOTO 9

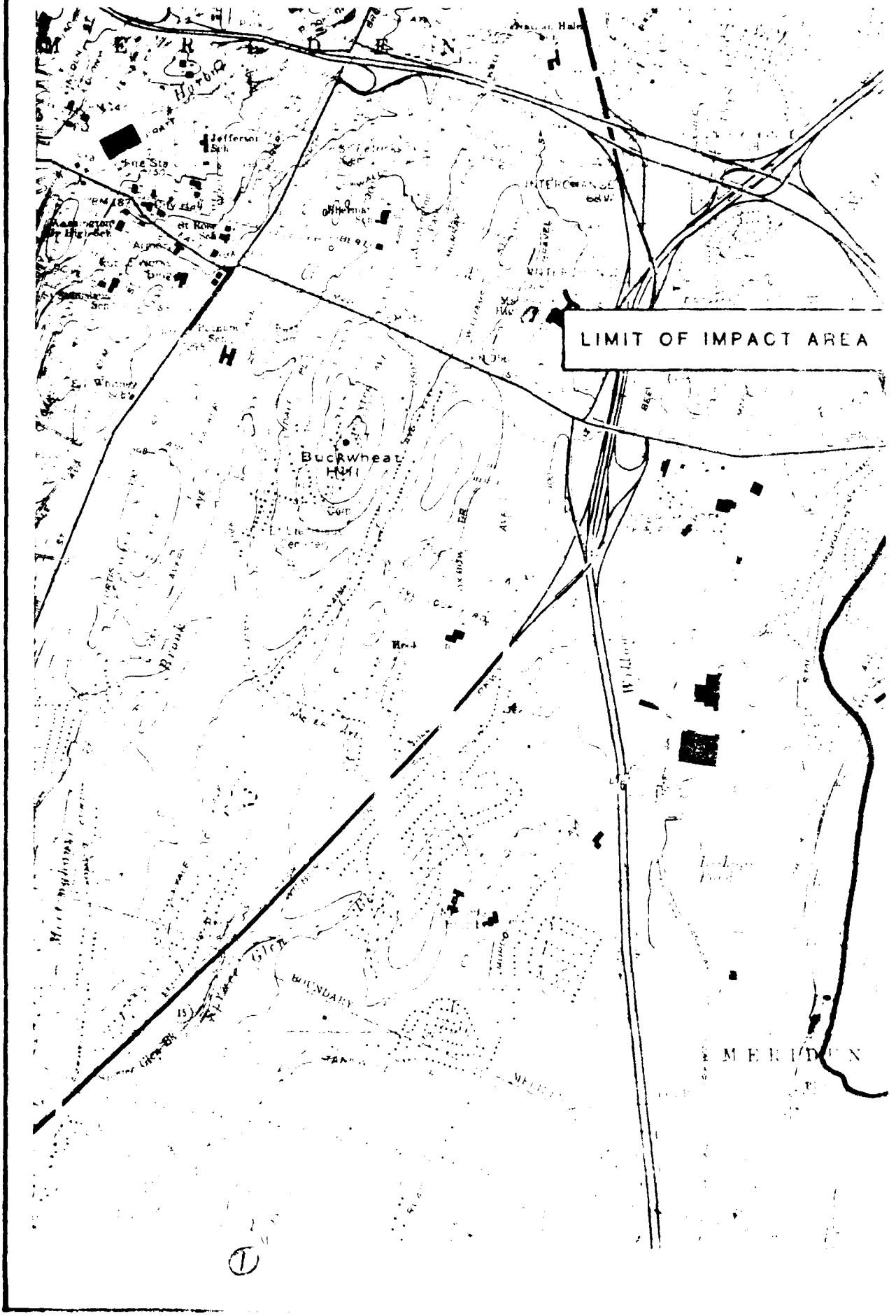
DOWNSTREAM CHANNEL

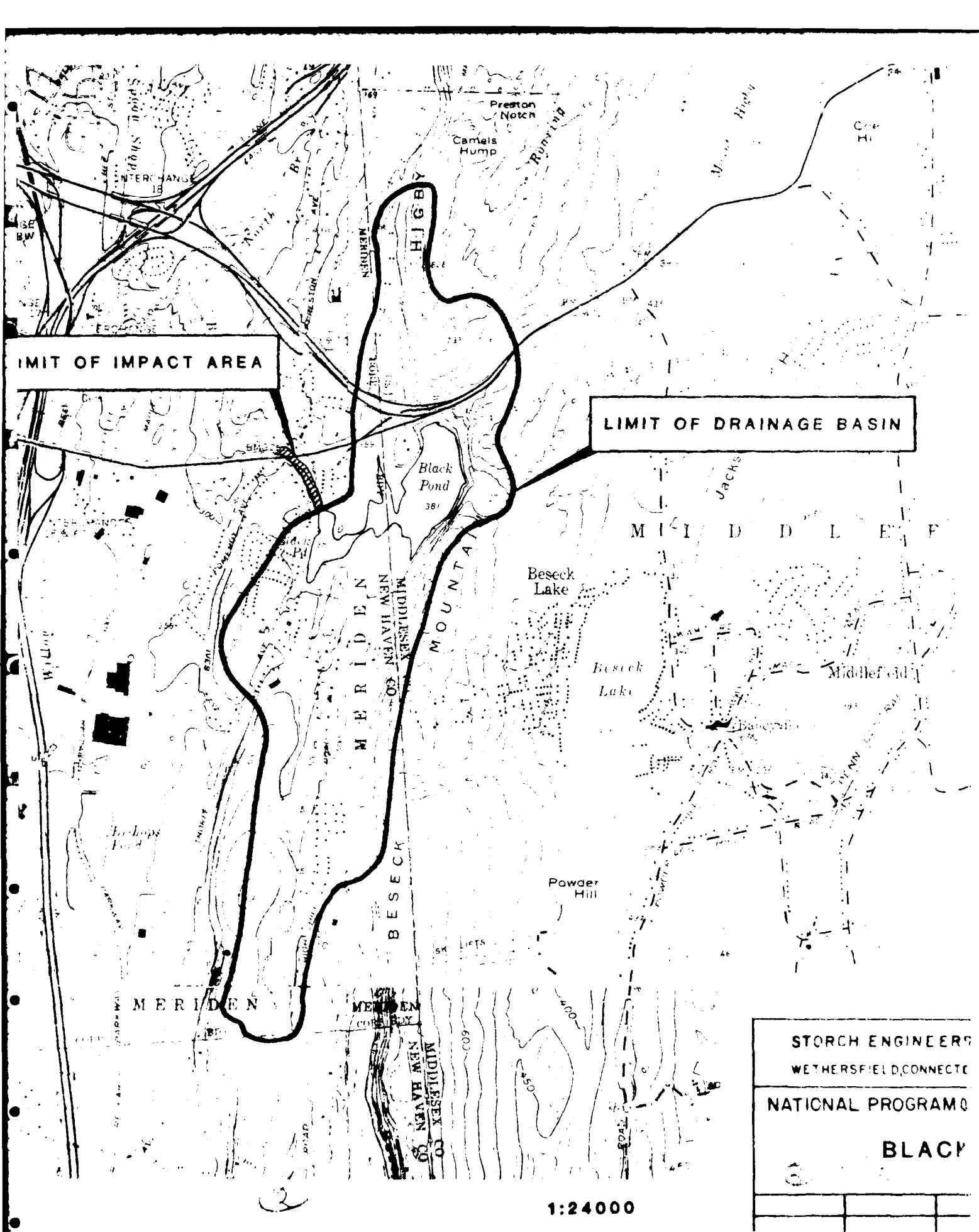
PHOTO 10

UPSTREAM POND

APPENDIX D

HYDRAULIC AND HYDROLOGIC COMPUTATIONS


LIMIT OF IMPACT AREA
Buckwheat Hill
MERIDEN



STORCH ENGINEERS
WETHERSFIELD, CONNECTI

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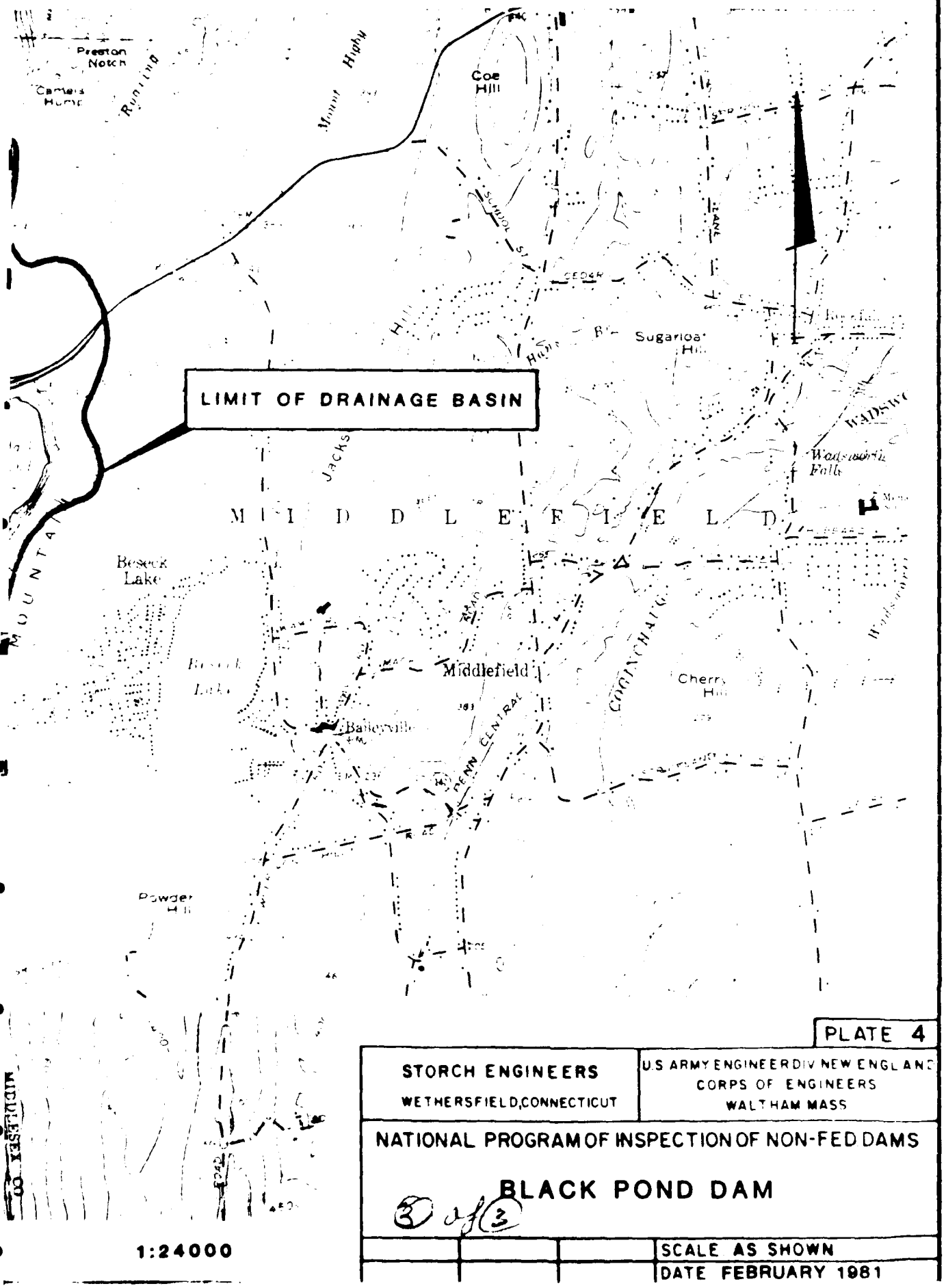


PLATE 4

STORCH ENGINEERS WETHERSFIELD, CONNECTICUT	U.S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

BLACK POND DAM

3 of 3

			SCALE AS SHOWN
			DATE FEBRUARY 1981

STORCH ENGINEERS
Engineers - Landscape Architects
Planners - Environmental Consultants

JOB Phase I Dam Inspection - #4463
SHEET NO _____ OF _____
CALCULATED BY GJG DATE 12-4-80
CHECKED BY BDC DATE 12/5/80

Determination of Test Flood

NAME OF DAM Black Pond Dam

DRAINAGE AREA 770 acres 1.2 SM

INFLOW Size: Small Hazard: High Test Flood: 1/2PMF

Inflow (2400)/2 = 1200 cfs/SM

$Q = 1200(1.2) = 1440$ cfs

Estimating the effect of surcharge storage on the Maximum Test Flood

1. Q_{P1} = 1440 cfs
2a. H_1 = 6.5' (elev.)
b. $STOR_1$ = .5.9"
c. $Q_{P2} = Q_{P1}(1 - STOR_1/9.5)$ = 560 cfs
3a. H_2 = 5.0' $STOR_2$ = 4.75"
b. $STOR_A$ = 5.275"

$Q_{PA} = 1440(1 - 5.275/9.5) = 640$ cfs

H_A = 5.1' $STOR_A$ = 4.5"

Test Flood = 640 cfs

Capacity of the spillway when the pond elevation is at the top of the dam

Q = 250 cfs or 45 % of the Test Flood

STORCH ENGINEERS
Engineers - Landscape Architects
Planners - Environmental Consultants

JOB Phase I Dam Inspection 4463
SHEET NO _____ OF _____
CALCULATED BY RJG DATE 11/7/20
CHECKED BY BOC DATE 12/8/20

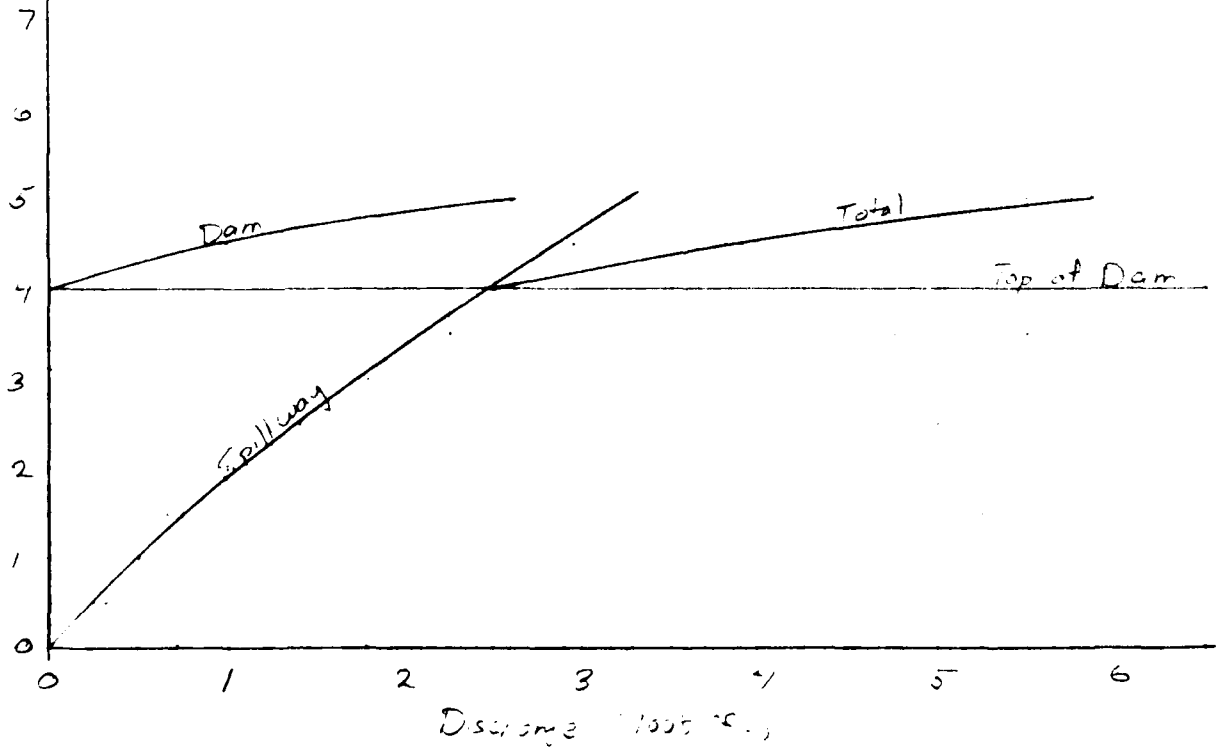
Stage Discharge

NAME OF DAM Black Pond Dam

$Q = CLH^{3/2}$

	Spillway I *				Spillway II				Dam				
Elev	C	L	H (HW)	Q	C	L	H	Q	C	L	H	Q	QT
			0	0									0
			.5	30									30
			1.0	50									50
			1.5	65									65
			2.0	100									100
			2.5	140									140
			3.0	180									180
			3.5	225									225
			4.0	250					100	↓	0		250
			4.5	295					2.7		.5	95	390
			5.0	325					2.63		1.0	200	595

* Inlet Control - Box Culvert



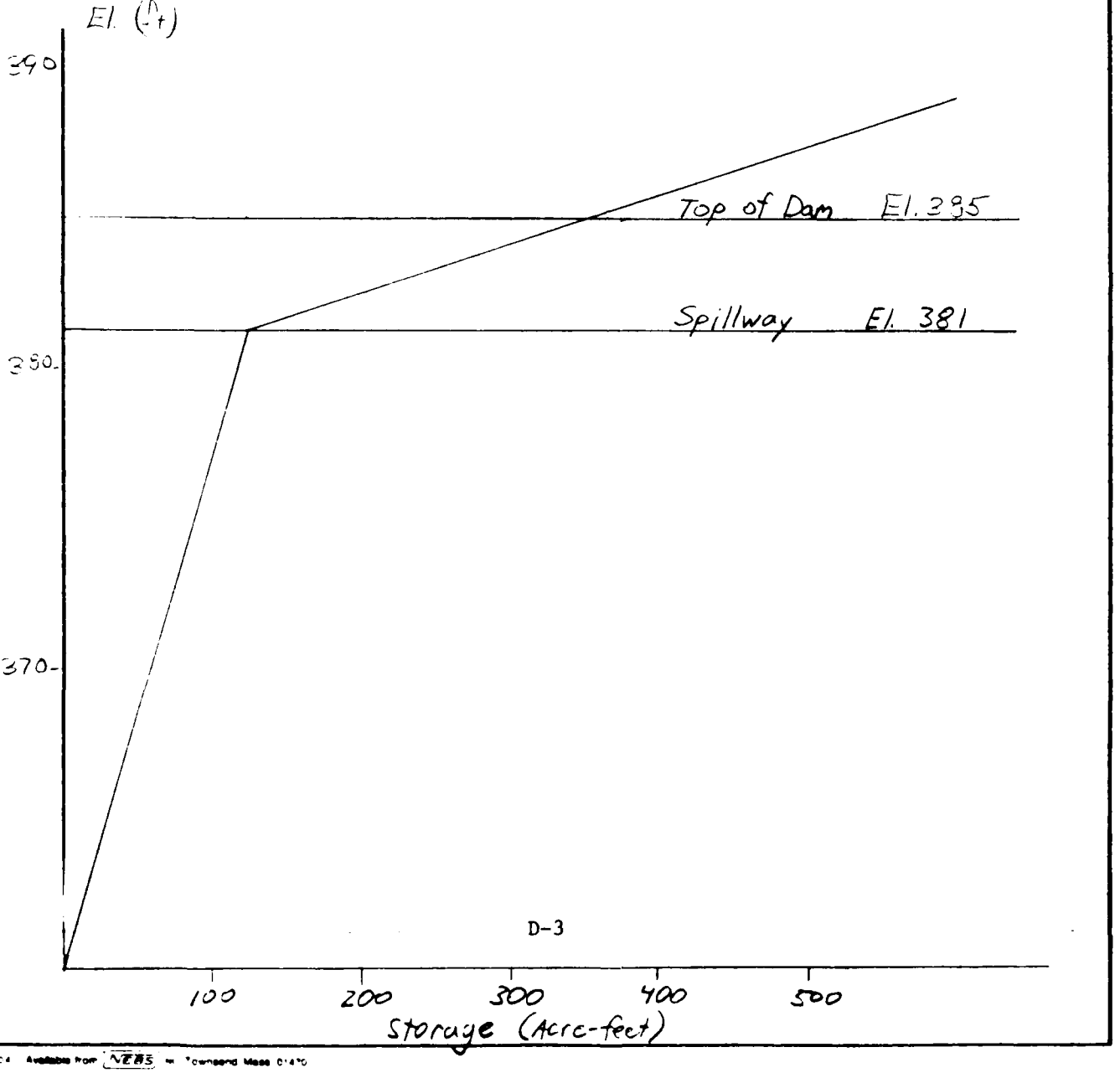
STORCH ENGINEERS
Engineers · Landscape Architects
Planners · Environmental Consultants

JOB Phase I Dam Inspection 4463
SHEET NO _____ OF _____
CALCULATED BY GJG DATE 12/4/80
CHECKED BY BDC DATE 12/8/80

AREA - CAPACITY

Name of Dam: Black Pond Dam

ELEV	DEPTH	AREA	AVG. AREA	VOL	Σ VOL
381		57.4			0
	4		57.4	229.6	
385		57.4			229.6
	5		58.7	293.5	
390		60.0			523.1



STORCH ENGINEERS
Engineers - Landscape Architects
Planners - Environmental Consultants

JOB Phase I Dam Inspection - #4463
SHEET NO ____ OF ____
CALCULATED BY [illegible] DATE 12/8/83
CHECKED BY [illegible] DATE 12/9/83

Downstream Hydrographs

"Rule of Thumb" Guidance for Estimating Downstream Failure Hydrographs

NAME OF DAM Black Bird Dam

Section I at Dam

1. $S = \frac{352.8}{8/27\ W_b\sqrt{g}}$ Acft $Y^{3/2}$
2. $Q_{P1} = 8/27\ W_b \sqrt{g}\ Y^{3/2} = 8/27\ (22)\sqrt{32.2}\ (26)^{1.5} = 5,573$
3. See Sections

Section II at

4a. H_2 = 10.5' A_2 = 755 L_2 = 620 V_2 = 11.2 Acft

b. $Q_{P2} = Q_{P1}\ (1-V_2/S)$ = 5,326 cfs

c. H_2 = 10.4' A_2 = 720

A_A = 772.5 V_2 = 11.6 Acft

$Q_{P2} = 5,573(1-11.6/352.8) = 5,390$ H = 10.4'

Section III at

4a. H_3 = 10.4' A_3 = 720 L_3 = 300 V_3 = 5.0 Acft

b. $Q_{P3} = Q_{P2}\ (1-V_3/S)$ = 5,311 cfs

c. H_3 = 10.4' A_3 = 720

A_A = 725 V_3 = 5.0 Acft

$Q_{P3} = 5,390(1-5.0/241.2) = 5,311$ * H = 11.2'

Section IV at

4a. H_4 = 8.2' A_4 = 1000 L_4 = 700 V_4 = 16.1 Acft

b. $Q_{P4} = Q_{P3}(1-V_4/S)$ = 5,057 cfs

c. H_4 = 8.1' A_4 = 960

A_A = 980 V_4 = 15.7 Acft

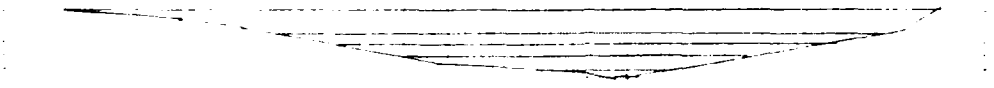
$Q_{P4} = 5,2[illegible]-15.7/336.2) = 5,062$ H = 8.1'

* From net [illegible] of curve

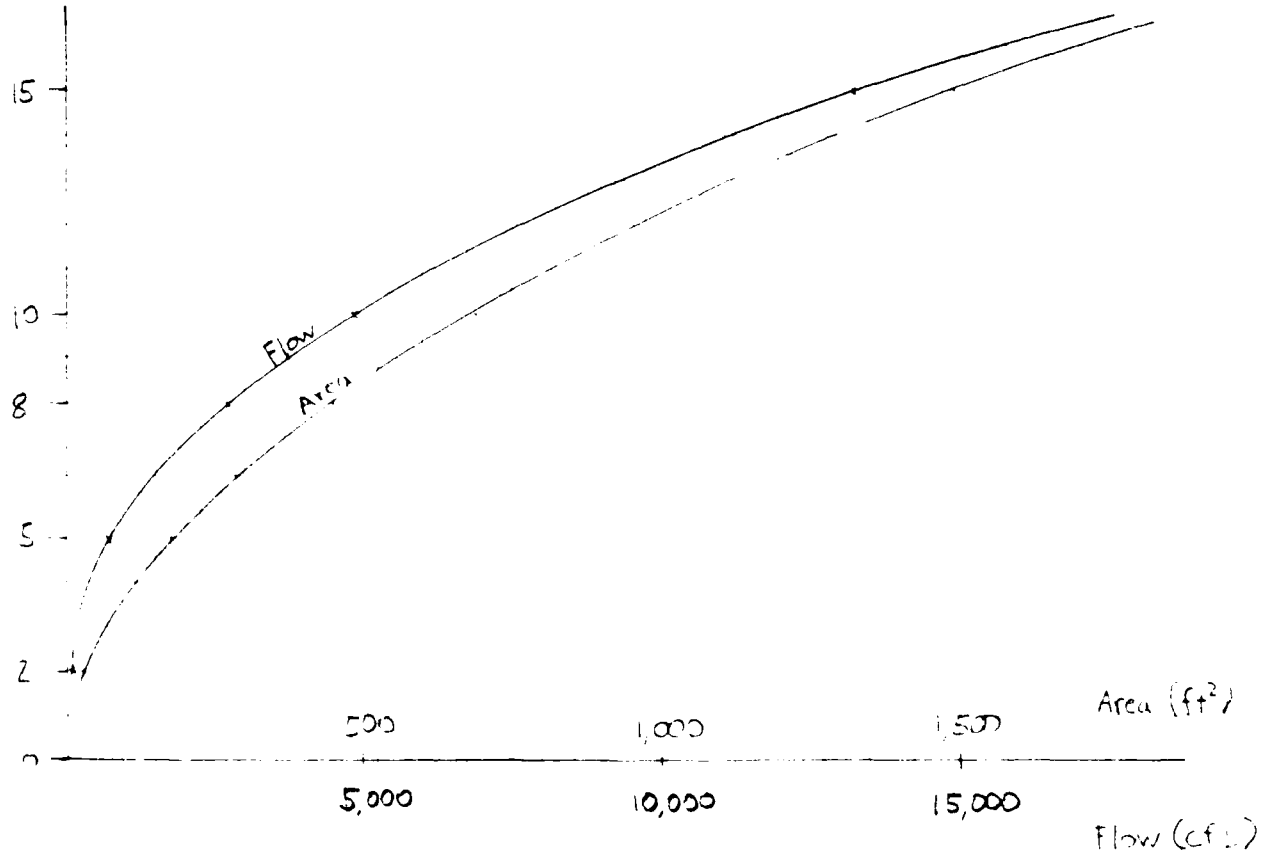
STORCH ENGINEERS/STORCH ASSOCIATES
Engineers - Landscape Architects
Planners - Environmental Consultants

JOB Black Bear Run
SHEET NO ___ OF ___
CALCULATED BY BDC DATE 11/17/80
CHECKED BY GJG DATE 12/8/80
SCALE ___

S = 3.67%
n = 0.12



D	WP	A	R	$R^{2/3}$	$S^{1/2}$	V	Q
2	24	28	1.17	1.11	0.191	2.63	74
5	79	177	2.24	1.71	"	4.06	718
8	11	450	4.05	2.54	"	6.02	2,711
10	138	691	5.01	2.92	"	6.95	4,802
15	205	1,491	7.27	3.75	"	8.89	13,260



STORCH ENGINEERS/STORCH ASSOCIATES
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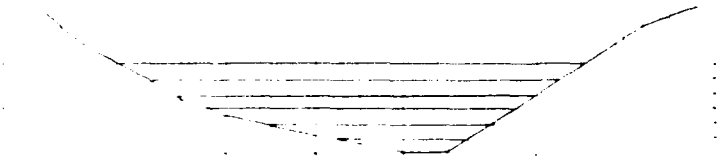
Planners - Environmental Consultants

JOB Block Face Com
SHEET NO ____ OF ____
CALCULATED BY JDC DATE 11/11/80
CHECKED BY RJG DATE 12/5/80
SCALE ____

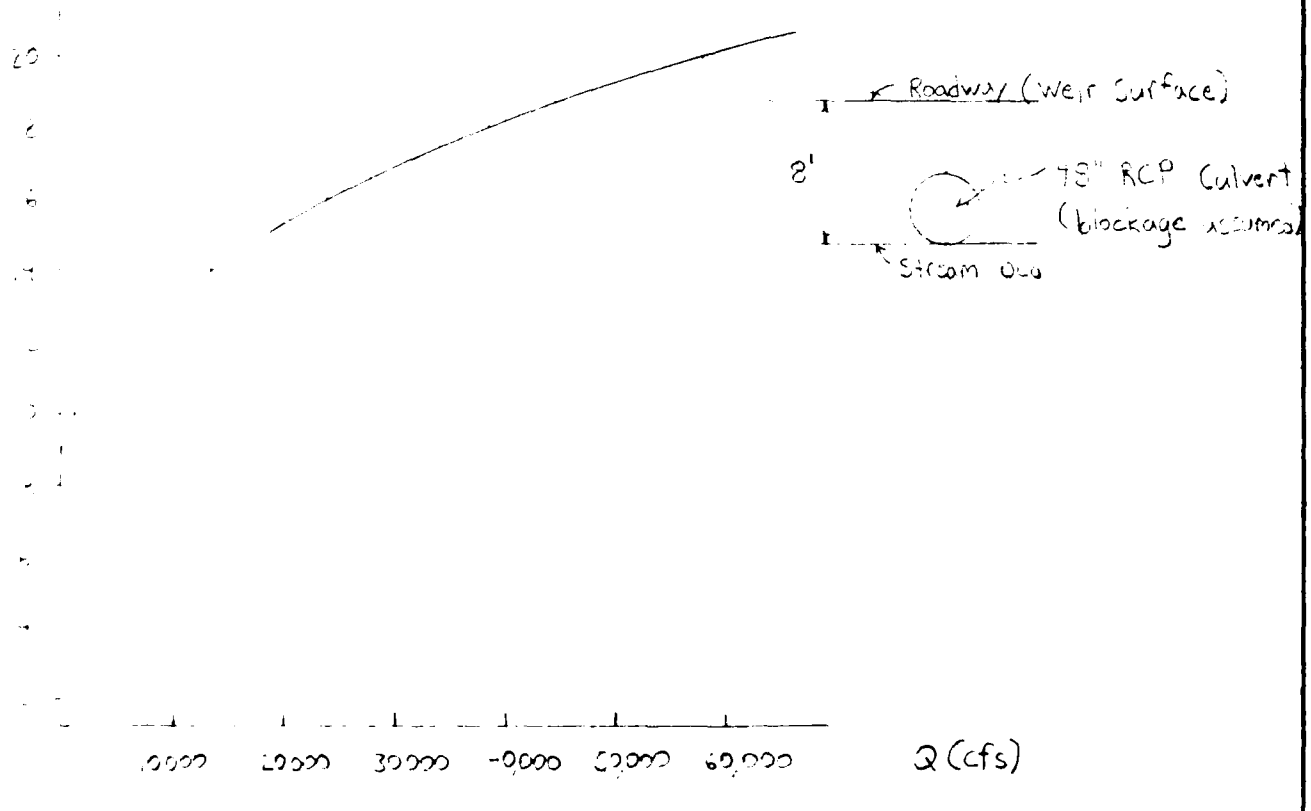
WEIR FLOW CALCULATIONS



EAST MAIN ST. PROFILE at CULVERT

$Q = CLH^{3/2}$

H	L	Q	H	L	Q
2	345	1,087	8	400	23,985
4	250	5,300	10	460	38,548
6	345	13,727	12	525	57,823

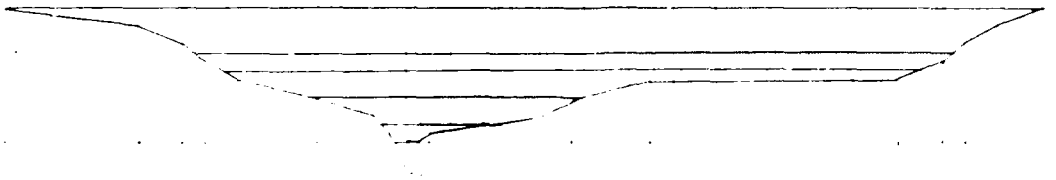


STORCH ENGINEERS/STORCH ASSOCIATES
Engineers - Landscape Architects
Planners - Environmental Consultants

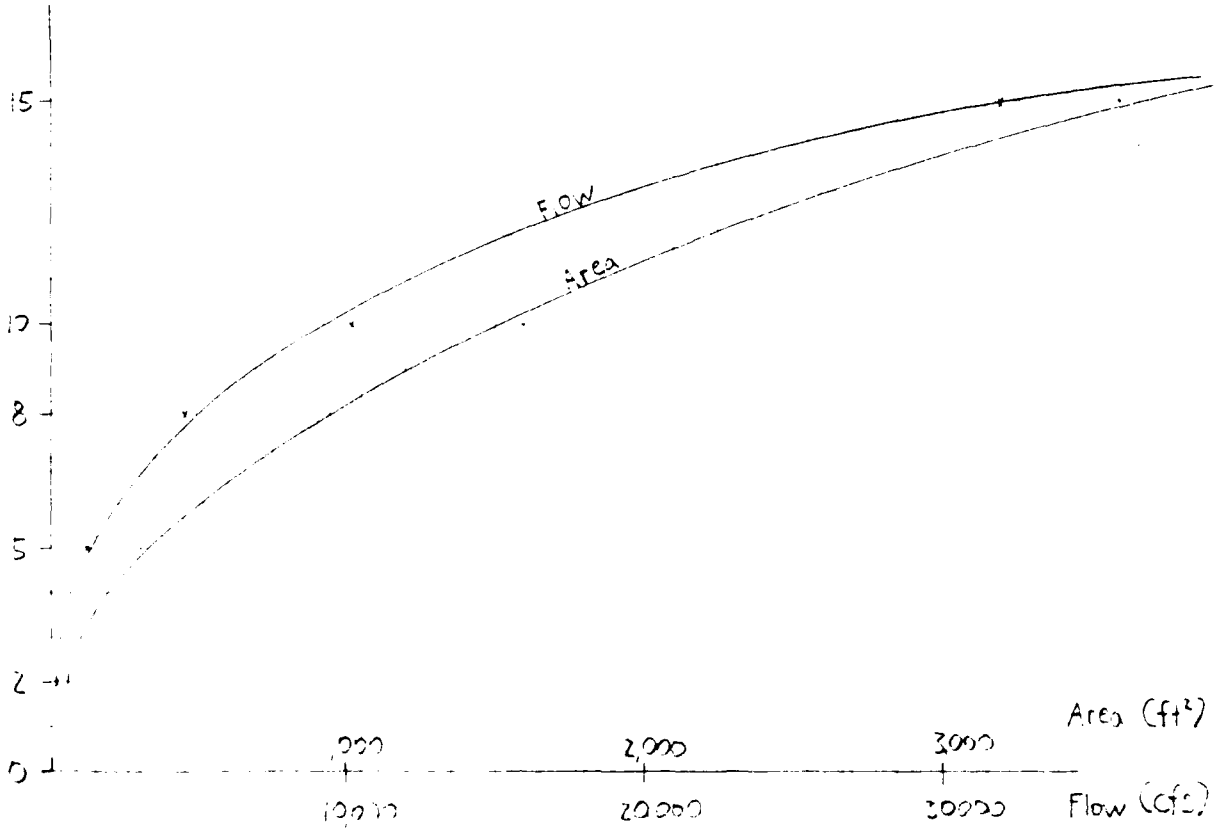
JOB East Ford Dam
SHEET NO ____ OF ____
CALCULATED BY RDC DATE 11/20
CHECKED BY BJG DATE 12/5/20
SCALE ____

θ = 3.33°
n = 0.12

5' / 20'



D	WP	A	R	$R^{2/3}$	$S^{1/2}$	V	Q
2	50	58	1.16	1.10	0.183	2.49	144
5	120	304	2.53	1.86	"	4.21	1,282
8	310	943	3.04	2.10	"	4.76	4,489
10	332	1,589	4.70	2.81	"	6.37	10,122
15	462	3,589	7.77	3.92	"	8.89	31,894



APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

FILMED

8-84